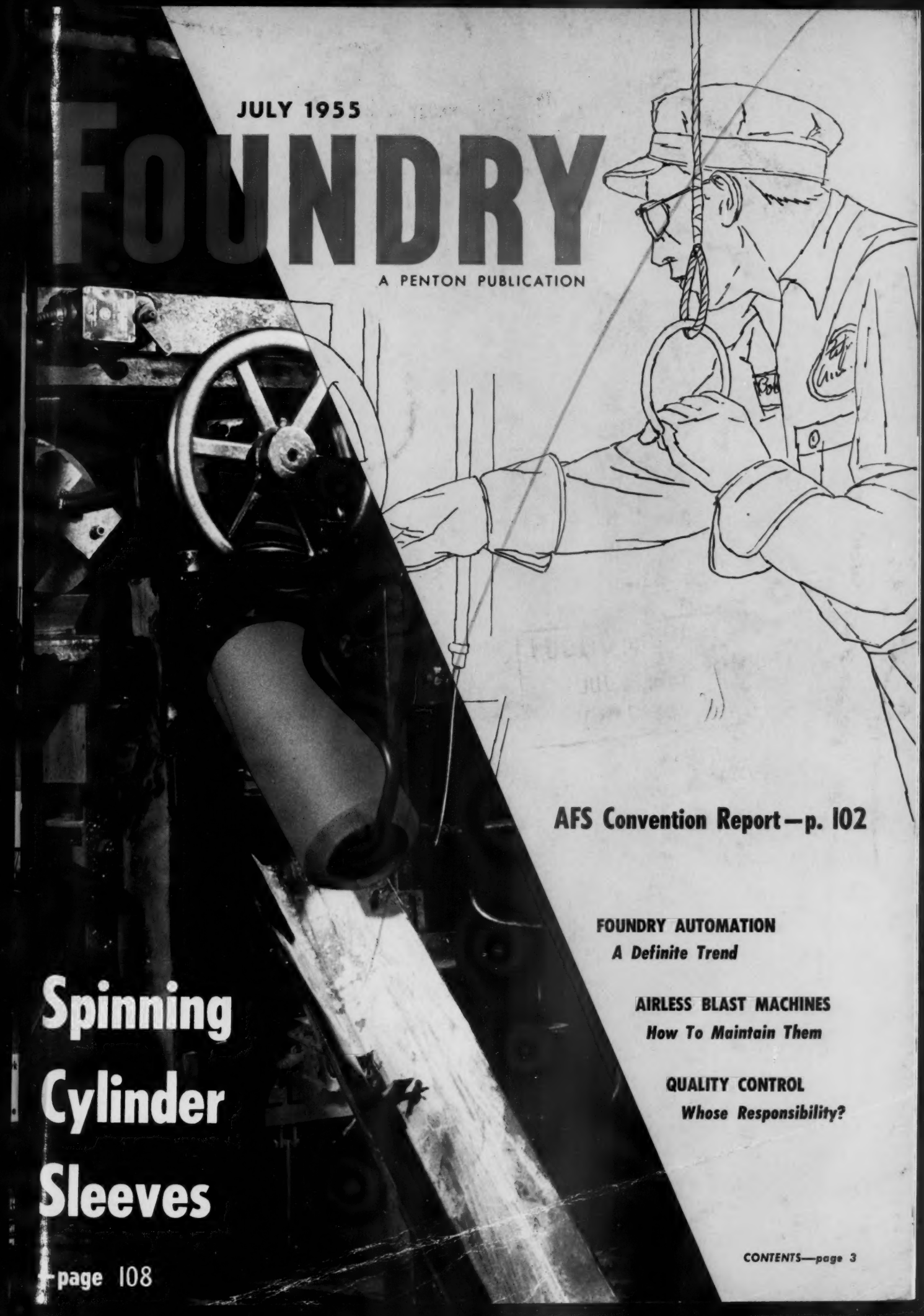
JULY 1955

FOUNDRY

A PENTON PUBLICATION



Spinning Cylinder Sleeves

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FOUNDRY AUTOMATION
A Definite Trend

AIRLESS BLAST MACHINES
How To Maintain Them

QUALITY CONTROL
Whose Responsibility?

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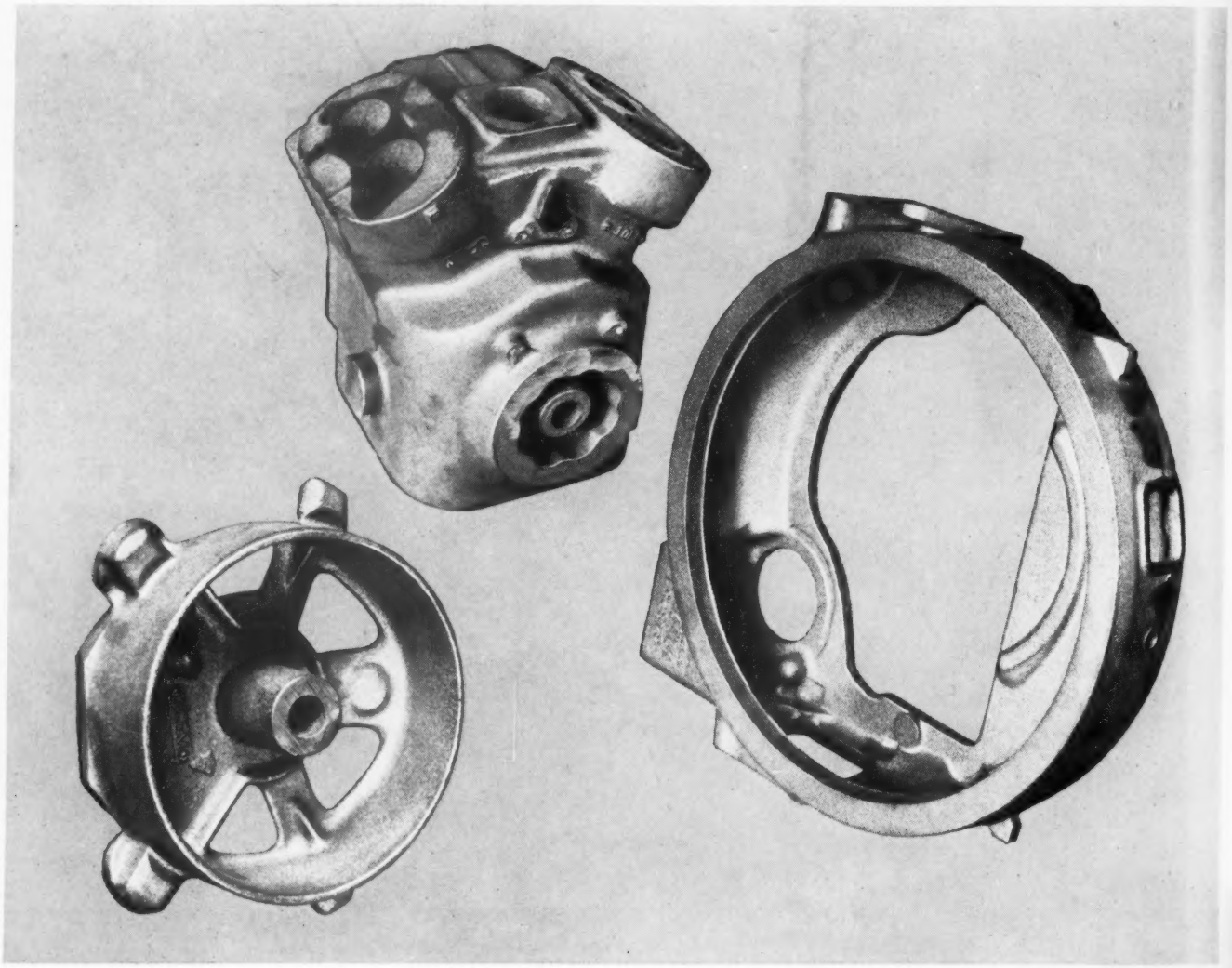
Q. How can YOU make BETTER GRAY IRON CASTINGS AT NO EXTRA COST?



A. FERROCARBO® by CARBORUNDUM

REGISTERED TRADE MARK

WHEN YOU TREAT your gray iron with FERROCARBO® in patented briquette form, you can furnish your customers with castings that are finer-grained, denser, stronger ...with fewer chilled spots and segregations. Machining tests in 11 leading shops prove that castings of gray iron treated with FERROCARBO® averaged 89.5% greater machinability per tool than untreated castings. And deoxidizing with FERROCARBO® generally permits the use of cheaper melting materials in the charge...so *you* make worthwhile savings, while giving your customers *premium* castings.

OVER 600 LEADING FOUNDRIES are now using FERROCARBO® to produce superior castings—both gray iron and malleable. Are *you* among them?

FREE BOOKLET! Gives advantages of FERROCARBO®, instructions for use, results. Write The Carborundum Company Dept. F 84-510, Niagara Falls, New York.

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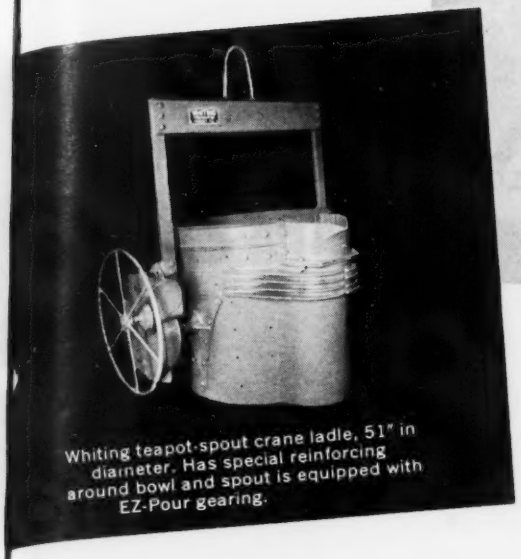
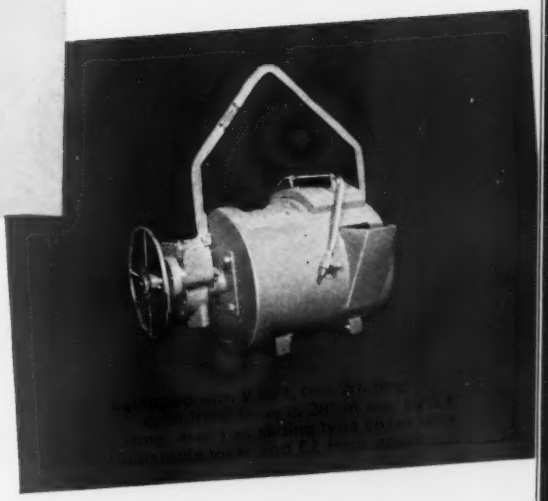
84-510

Whiting standard 26" ladle and truck, equipped with EZ-Pour gearing and insulated cover. Has closed standards and no bail. Truck has 16" dia. wheels for 24 gauge track. Other gauges available.



Whiting teapot-spout crane ladle, 51" in diameter. Has special reinforcing around bowl and spout is equipped with EZ-Pour gearing.



SPECIALLY ENGINEERED LADLES for special service

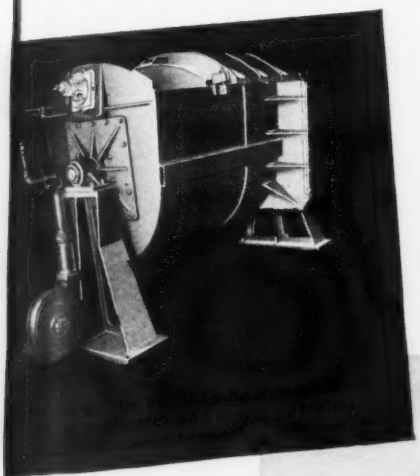
SPEED POURING... CUT COSTS!

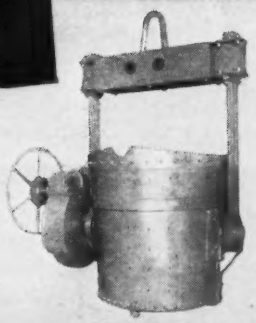
Whiting knows ladles. Proof is the thousands of Whiting ladles in use . . . *reason* is Whiting's 70 years' experience building these ladles. That's why Whiting can give you the ladle you want and need. That's why Whiting's special engineering service means the best possible performance at the lowest possible cost.

For example, take a look at the specially engineered Whiting ladles shown on this page . . . only a few of many designed for specific applications. With such special features as structural steel spouts, riveted or welded heads and extra reinforced bowls, they withstand the toughest day-in-day-out, year after year service.

Remember, too—in addition to the "specials", Whiting carries a complete line of standard ladles . . . all known for their longer-lasting, economical performance. They include hand and shank ladles, covered trolley ladles, covered crane ladles, riveted crane ladles, geared and non-geared bottom-top ladles, cylindrical ladles, mixing and reservoir ladles.

Send today for complete information on all Whiting Ladles!





Whiting special 66" top diameter square bail combination lip and bottom pour ladle with laminated bail arms and heat shield, anti-friction trunnion bearings and helical worm gear bracket.

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specially selected and prepared for foundry use only

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FEDERAL *guarantees* that GREEN BOND will produce the *highest* green and dry bond strength of any of the western bentonites.

FEDERAL GREEN BOND's medium to low gelatinating characteristics cut down on mulling time—permit slurry users to add up to 25% more bentonite per gallon of slurry, without strain on the pumping system.

FEDERAL GREEN BOND has a pH value of 9.0

FEDERAL GREEN BOND lasts and lasts—retaining its bonding efficiency much longer than any other bonding agent.

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FEDERAL GREEN BOND contributes materially to the production of castings that are free of defects—castings that require much less cleaning—castings that look good and bring higher prices.

FEDERAL controls every phase of the production of GREEN BOND, from mining and processing to sales and technical service.

FEDERAL GREEN BOND is carried in stock in FEDERAL warehouses in principal cities in the U. S., Canada, British Isles and Continental Europe. It is available in *three* convenient forms: (1) PULVERIZED—for general foundry use as a dry additive, for core and molding sand. (2) GB-100 FINE GRANULAR—a dry additive with low dust content, for core and molding sand. (3) No. 1200 SLURRY GRADE GRANULAR—for use as a wet additive.

IMPORTANT!

Here's an essential point to remember, when selecting your source for bentonite . . . FEDERAL GREEN BOND is sold and serviced by FEDERAL's own trained, technical service engineers! FEDERAL's interest in your use of its products doesn't stop at the time of sale, but continues beyond, in the form of technical service and assistance.

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A PENTON PUBLICATION

July 1955
Volume 83—Number 7

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Troubles vanish when you put ADM foundry products to work in your foundry.
You improve casting quality, reduce core-room costs and foundry rejects.

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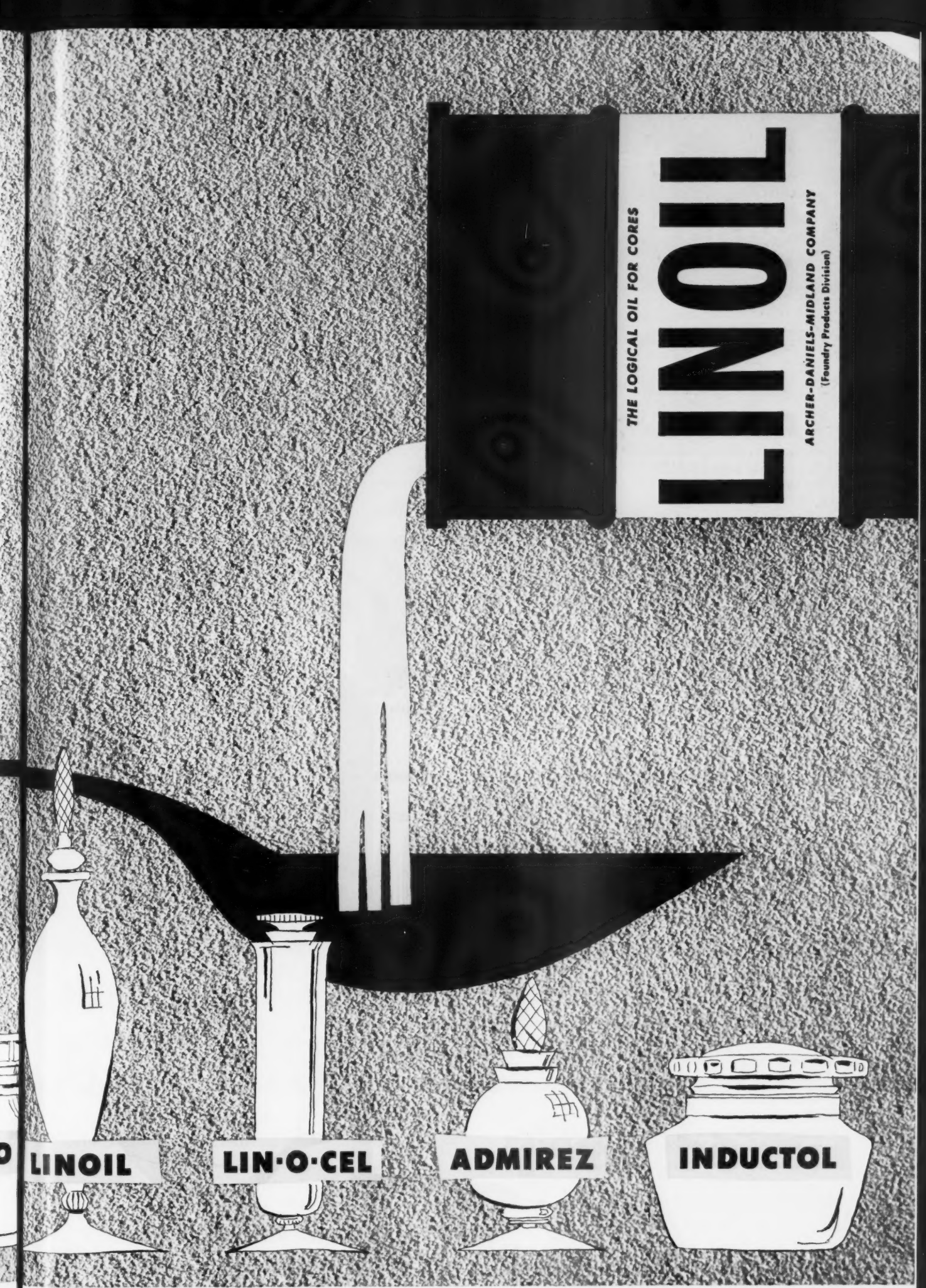

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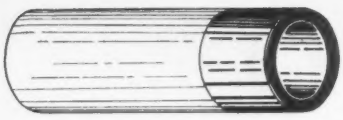
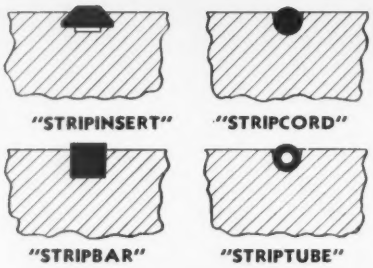
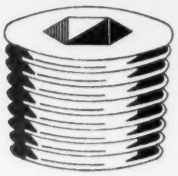


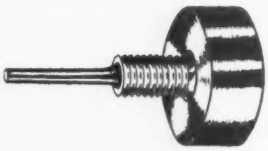
"SAND ARRESTER TUBE"
Blows perfect core without hand work; prevents bell mouth blow holes; saves cores, castings and time.



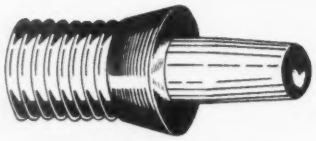
Hold Parting Line



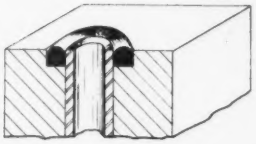
"HOLINER" BUSHINGS
Seals around blow holes at the junction of blow plate and core box.



"PULLINSERT"
Stops abrasion under blow holes. Needs no adhesive, is easily replaced.

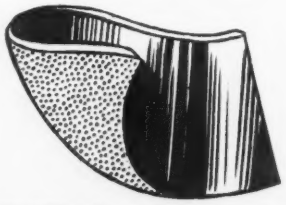


"PROTEXABOX" PIN
Can't mar box parting, never vibrate loose, prevent pin lug damage.



"D RING" COLLARS
Seal around the top of blow tubes, vent rods and guide pins.

"SUPER SLICK"
Core room and foundry hand tool. Use to scrape, pry, chisel and pull nails. A new one free if you return one broken.



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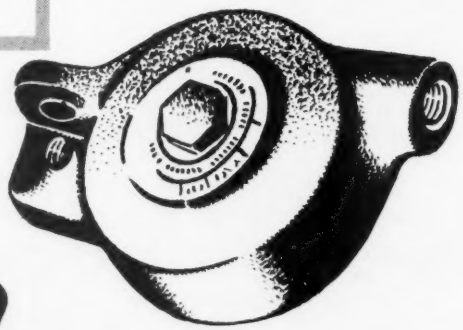
Resilient abrasion resistant sheet stock for inlays, overlays and gaskets. Oil and heat proof.

"VIBROLATOR"

Quiet non-destructive vibration for draw plate, feeders and magazines. No maintenance or lubrication necessary.



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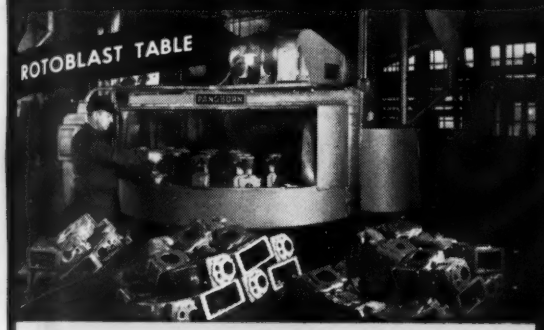
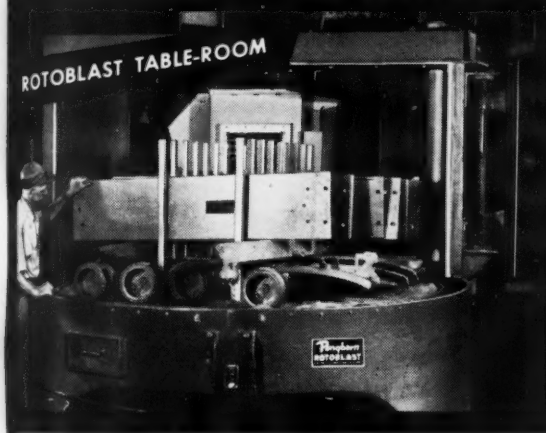


cheaper...



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Send for free copy of Bulletin 214 today! The few minutes you take to write can save you thousands of dollars annually. Write PANGBORN CORP., 1400 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Blast Cleaning and Dust Control Equipment.*

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Rotoblast Tables & Table-Rooms

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Edco Dowmetal Bottom Boards—made by Christiansen Corporation—have proven again and again that their light-weight characteristics make for safe, easy-to-handle, permanent equipment in any foundry.

They eliminate swelled castings, pay for themselves in no time. There are 83 standard sizes to choose from, so chances are there's a size to fit your particular problem. Write for more information, and for a price schedule and list of 83 standard Edco sizes.

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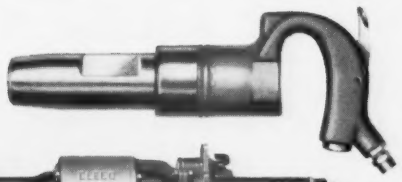

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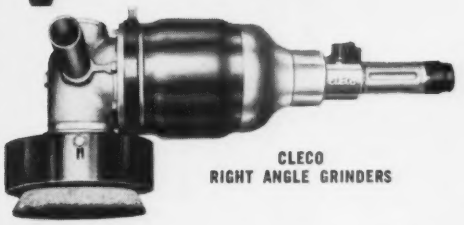
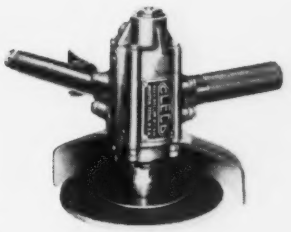
CLECO HORIZONTAL GRINDERS



CLECO RIGHT ANGLE GRINDERS



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FOR all your light or heavy duty grinding, ramming, and chipping there's a properly balanced Cleco air tool designed with your particular problem in mind . . . to save you time, money and maintenance.

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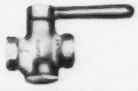

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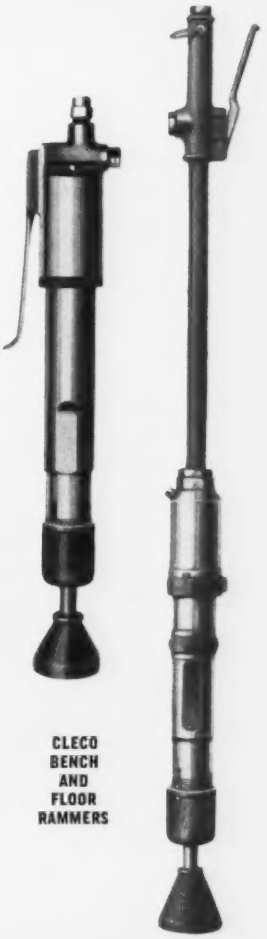


CLECO BENCH AND FLOOR RAMMERS

That's the load this Imperial Belt handles

In the Landers, Frary & Clark foundry at New Britain, Conn., this Imperial Standard Sahara Belt receives 250 F. sand from the shake-out and carries it to the mixers.

Operating at a speed of 100 feet per minute, it moves 47 tons of sand per hour . . 376 tons every 8-hour day!

Made to last longer. Danger of damage by heat and abrasion is high. In addition, there are gaggers in the sand for about half the belt length, until removal by a magnet. But Imperial's super-tough construction of heavy-duty hard silver duck enables it to withstand this rigorous service . . . performing satisfactorily day-after-day without costly shut-downs for maintenance.

The five plies of this belt (132' x 18') are double stitched with inner-locking stitches to positively prevent ply separation. Imperial's exclusive impregnating compounds lubricate and toughen the base fabric and insulate it against the destructive action of sustained temperatures to 300° F. and temporary peaks of 350° F. Other Imperial Belts are made to withstand temperatures as high as 600° F.

Job-designed belting. Whatever your belting needs, there is an Imperial job-designed belt that will outperform any other belting made and give you lowest long-time operating cost. Write for Data Sheet 54-2 and describe your belting problem.

Imperial BELTING CO.
1755 S. Kilbourn Ave., Chicago 23, Ill.
You expect more from Imperial . . . and you get more!

With the EDITORS

CONVENTION IMPRESSIONS: Perhaps the most discussed event during the AFS convention was best described in the following headline from *The Houston Chronicle* on Wednesday, May 25:

H. Munroe of 810 Ogilvie St. L. Munroe is a navigation ton Air Force Base.—Post Photo by Keith Hawkins

Sizzling 95 Sends City Into Heat Cycle

Year's Hottest Day Breaks 30-Year Mark for May 24

Summer soared into the season's first sizzler Tuesday, the temperature hitting 95 degrees, and Weather Bureau

Yes, the temperature was high, and so was the humidity.

But those journeying to Houston came away with many pleasant memories. A few of mine are as follows:

A hard-working group of men and women from the foundry industry of Houston and the Southwest doing everything possible to make the convention a success and providing that good old Southern hospitality.

A sign on the banquet table saying "No Tipping." Not the usual beating around the bush with a note about arrangements with the hotel management regarding gratuities, etc. Let's have more such signs!

The best attended technical sessions in many a year, and this in the face of a small over-all registration. This year it seemed in style to attend meetings.

Better than 1000 at the Texas Chapter Night at Pin Oaks Stables Horse Show Pavilion, with ever so many of the brothers from up North trying (desperately we should say) to look more like Texans than the real variety.

Hugh M. Comer, chairman, Avondale Mills, Sylacauga, Ala., (he gave a splendid talk at the banquet) tracing his progress step by step from an hourly employee to the chairman of the board of his company, and then remarking that he had a certain amount of aid in the climb since his father owned the outfit.

Modest Al Pfeiffer, in responding to the awarding of a life membership in the AFS, referring to his organization as "the company who has made Milwaukee famous for products used around the world, and whose name is found on your program." In case you have forgotten, it's Allis-Chalmers Mfg. Co.

Seeing many old friends and meeting new ones. This was my greatest pleasure during the week at Houston.

—o—

Lighter Armor: An article entitled "Armor for Atomic War," by Capt. John C. Burney Jr. in the May-June issue of *Ordnance,* emphasizes the need for lighter, more mobile tanks. To accomplish this, the suggestion is made by the captain that every means possible of decreasing the thickness of armor should be investigated. This is a field that will be of interest to a number of steel foundrymen.

—o—

Men at Work: It is indeed a pleasure to present the accompanying illustration of an important member of the foundry industry performing tasks far beyond the ordinary call of duty.

The Decatur and Macon County Hospital Association, Decatur, Ill., celebrated National Hospital Week on May 10 with a dinner for the board of directors and medical staff. A feature of the dinner was the carving of the turkey by Dr. H. J. Bavor board of directors and medical staff. and slicing of the beef by John A.

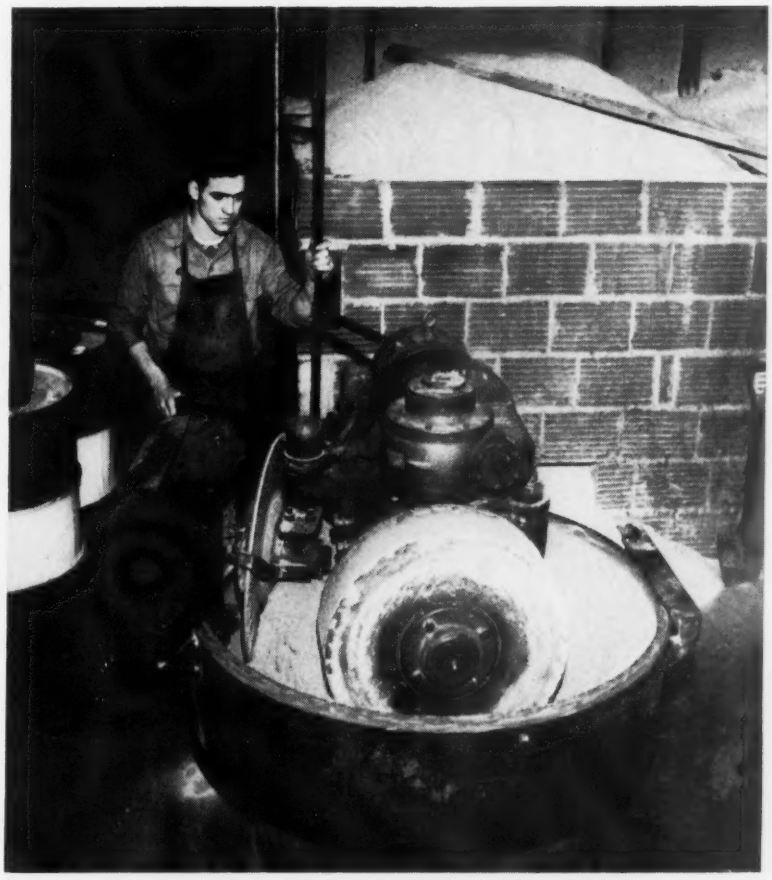
Wagner, president, Wagner Malleable Iron Co. John has been a member of the hospital board for eight years and president for the past year.

Make mine medium, John.

—o—

Come Again, Soon: During the Houston convention I had a very pleasant visit with the Aveys from Tulsa. Dan Avey was editor of FOUNDRY from 1926 to 1936. Prior to that he was managing editor for a number of years, so that I spent the first 12 years on this publication under his able tutelage. We had a good time in recalling many events of the past, as well as considering the de-

the Clearfield Mixer



This No. 404 Clearfield Mixer has been in operation for eight years in the core shop of the Railway and Industrial Engineering Co. of Greensburg, Pa., makers of electrical switchgear for substations and generating stations. During that time it has required only very few minor repairs and "has paid for itself many times over."

gives you BETTER FOUNDRY SAND

Better, because bond and moisture are uniformly distributed. By breaking down all lumps, caking is eliminated, freeing all material from the bottom surface. Clearfield Mixers, with vertical rotating mullers and unique rotating pans, are faster in performance and result in better production.

Write for Catalog No. 83. Gives full details on the Clearfield Mixer for your need.

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thorough
sand preparation

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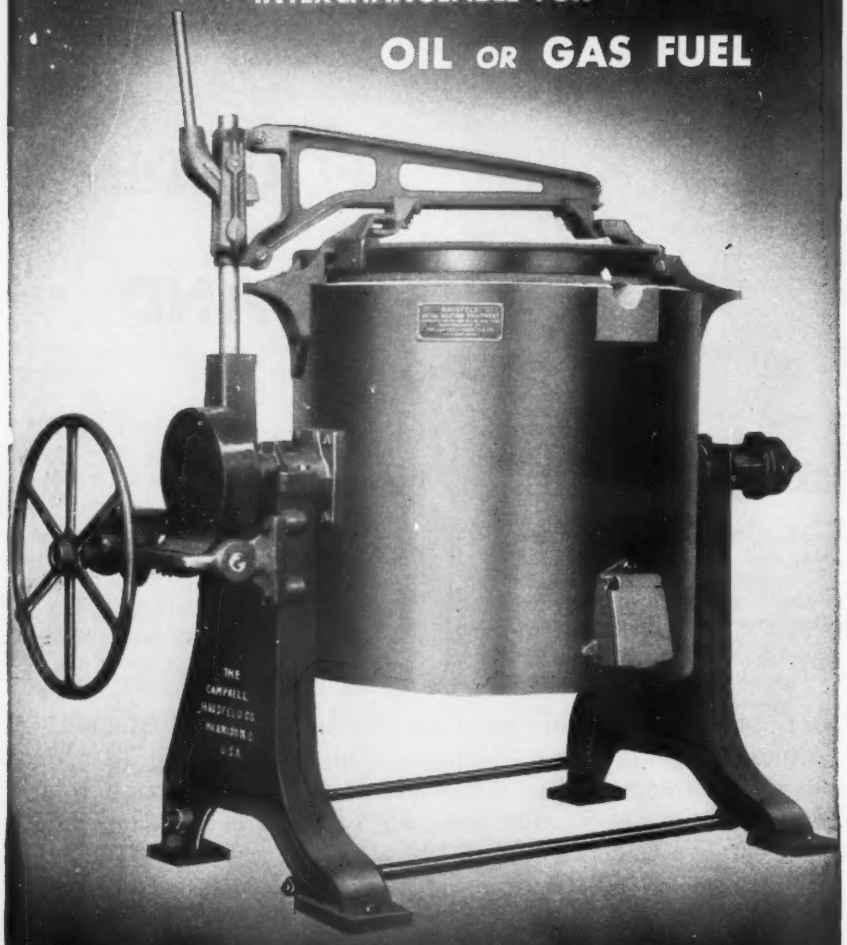


Built for Service

The Campbell-Hausfeld Co.

300-320 MOORE ST. HARRISON, OHIO

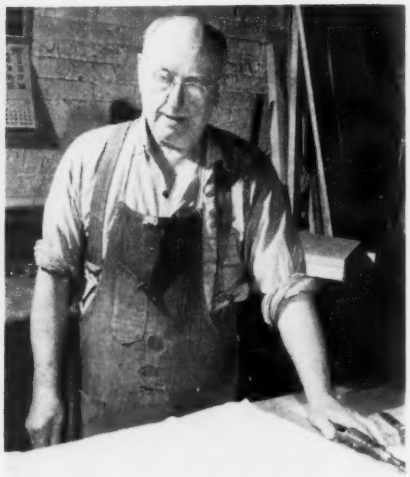
velopments currently taking place.

Dan also was active in the AFS over a period of years. He worked on many committees, was on the board of directors and served two terms as president in 1934 and 1935. Later he was secretary-treasurer of the society.

I hope that meeting and visiting with many old friends proved such a pleasant experience that the Aveys will make another annual convention, soon.

—o—

Sixty-three Years a Patternmaker: A recent issue of *A-C Views,* an employee publication of the Allis-Chalmers Mfg. Co., tells that Paul Licau



has been a patternmaker for 63 years and has been with Allis-Chalmers for over 55 years. This is quite a record.

Mr. Licau started his apprenticeship in a small Milwaukee shop 65 years ago; he worked in a number of shops in the area and joined the old E. P. Allis Co., predecessor to Allis-Chalmers, in 1899. He was the first patternmaker to start at the West Allis Works. He has helped build many big patterns, such as a part for a huge Corliss-Reynolds engine that took ten men four months to build. About 30,000 lineal feet of lumber was contained in the pattern and the casting weighed 98 tons.

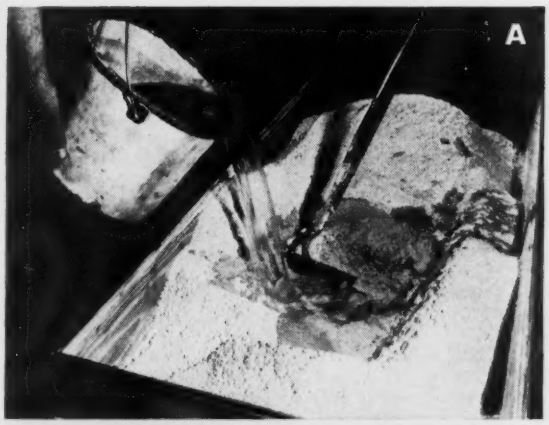
Congratulations to the holder of such a fine record in a wonderful industry.

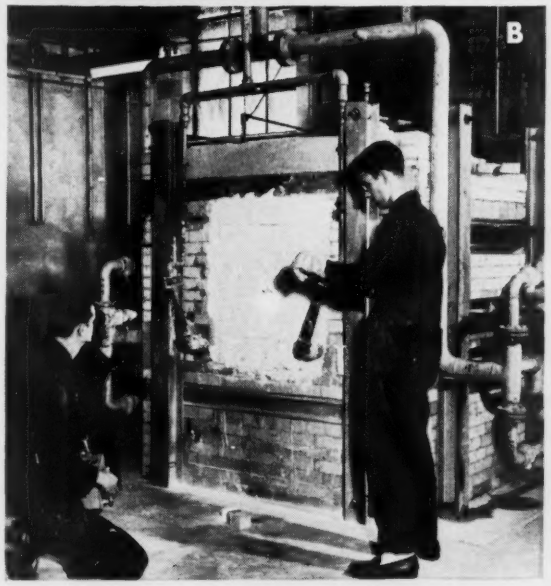
—o—

Bob Kennedy Moves: Robert E. Kennedy, secretary emeritus, AFS, has moved to Westville, Ind., so that he can be near Mrs. Kennedy, who is in a hospital there. The post office address is Box 539. Westville is located in northern Indiana at the intersection of U. S. 6, U. S. 421 and Ind. 2. Bob will be happy to see any of his friends traveling that way.

F.G.S.

NEW B&W 3200 degree Refractory Concrete





Today, in some types of heating and melting furnaces, complete linings or sections of linings are subjected to temperatures over 3000 F and, with the trend to higher and higher operating temperatures, the problem of finding the most economical refractories for this "over 3000 F service" will become even more important.

Now, with B&W's new Refractory Castable-3200, furnace builders and operators can cut installation costs by using castable construction for services up to 3200 F. As easy to use as other B&W refractory concretes, B&W Refractory Castable-3200 can be poured or trowelled into place or applied with a cement gun.

Several years ago, B&W developed Kaocast, the first successful 3000 degree refractory concrete, to lead this high temperature castable trend. B&W Castable-3200, like Kaocast, is made with an alumina-silica base and is recommended for temperatures from 2600 to 3200 F. Because of its very high temperature properties, it is not recommended for temperatures below 2600 F.

If you have not taken advantage of the fast, low cost installation of castables for your high temperature requirements, we suggest you investigate B&W Kaocast and the new B&W Castable-3200. Your local B&W Refractories Engineer has all the facts.

A Mixed like structural concrete, B&W Refractory Castable-3200 can be poured, trowelled or gunned into place. • **B** High temperature laboratory furnace lined with B&W Refractory Castable-3200.

B&W REFRACTORIES PRODUCTS: B&W Allmul Firebrick • B&W 80 Firebrick
B&W Junior Firebrick • B&W Insulating Firebrick • B&W Refractory Castables, Plastics and Mortars
OTHER B&W PRODUCTS: Stationary & Marine Boilers and Component Equipment
Chemical Recovery Units • Seamless & Welded Tubes • Pulverizers • Fuel Burning Equipment
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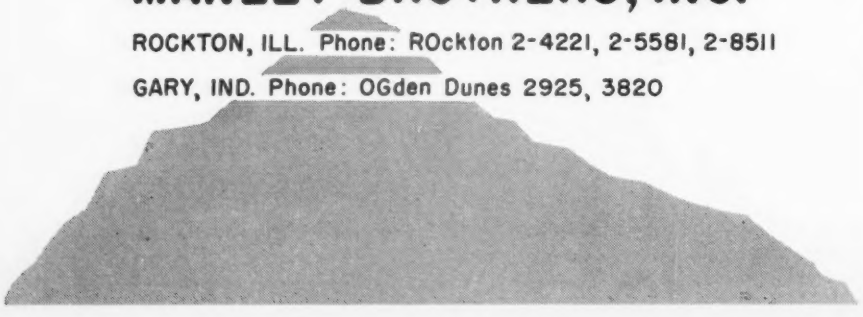


CALENDAR of Meetings

July 12-14—Western Plant Maintenance Show, Pan-Pacific Auditorium, Los Angeles.

Sept. 6-17—National Machine Tool Builders Association, machine tool show, International Amphitheater, Chicago.

Sept. 6-17—Coliseum Machinery Show, Chicago Coliseum, Chicago.

Sept. 6-17—Production Engineering Show, Navy Pier, Chicago.

Sept. 12-16—Industrial Engineering Conference, Michigan State University, East Lansing, Mich.

Sept. 12-16—Instrument Society of America, instrument conference and exhibit, Shrine Exposition Hall and Auditorium, Los Angeles.

Sept. 29-30—Missouri Valley Regional Foundry Conference, sponsored by St. Louis, Tri-State, and Mo-Kan Chapters of AFS and Missouri School of Mines Student Chapter, at Missouri School of Mines and Metallurgy, Rolla, Mo.

Oct. 6-7—National Foundry Association, annual meeting, Edgewater Beach Hotel, Chicago.

Oct. 13-15—Committee on Vacuum Techniques Inc., symposium on vacuum technology, Mellon Institute, Pittsburgh.

Oct. 13-15—Foundry Equipment Manufacturers Association, annual meeting, The Greenbrier, White Sulphur Springs, W. Va.

Oct. 14-16—Northwest Regional Foundry Conference, Portland, Oreg.

Oct. 16-18—Conveyor Equipment Manufacturers Association, annual meeting, The Greenbrier, White Sulphur Springs, W. Va.

Oct. 17-18—American Coke & Coal Chemicals Institute, annual meeting, The Greenbrier, White Sulphur Springs, W. Va.

Oct. 17-21—American Society for Metals, national metal exposition and congress, Convention Hall, Philadelphia.

Oct. 17-21—National Safety Council, national safety congress and exposition, Conrad Hilton, Congress, Morrison and LaSalle Hotels, Chicago.

Oct. 18—American Society of Safety Engineers, annual meeting, Conrad Hilton Hotel, Chicago.

Oct. 19-21—Gray Iron Founders' Society, annual meeting, Schroeder Hotel, Milwaukee.

Oct. 20-21—Ohio Regional Foundry Conference, sponsored by Ohio AFS chapters, Case Institute of Technology, Cleveland.

Oct. 24-25—Steel Founders' Society of America, fall meeting, The Greenbrier, White Sulphur Springs, W. Va.

Oct. 31-Nov. 1—Magnesium Association, annual meeting, Biltmore Hotel, New York.

Nov. 1-3—Grinding Wheel Institute and Abrasive Grain Association, fall meeting, Statler Hotel, Buffalo.

Nov. 3-4—Metals Casting Conference, Purdue University, Lafayette, Ind.

Nov. 14-17—Second International Automation Exposition, Navy Pier, Chicago.

Nov. 16-18—Steel Founders' Society, annual Technical and Operating Conference, Hotel Carter, Cleveland.

Dec. 1-2—Michigan Regional Foundry Conference, Michigan State College, East Lansing, Mich.

Dec. 7-9—American Institute of Mining & Metallurgical Engineers, electric furnace steel conference, Hotel William Penn, Pittsburgh.

1956

Mar. 7-8—Foundry Educational Foundation, college-industry conference, Hotel Cleveland, Cleveland.

Mar. 19-20—Steel Founders' Society, annual meeting, Drake Hotel, Chicago.

May 3-9—American Foundrymen's Society, annual convention and exhibition, Convention Hall, Atlantic City, N. J.

June 5-8, Materials Handling Institute, materials handling exposition, Public Auditorium, Cleveland.

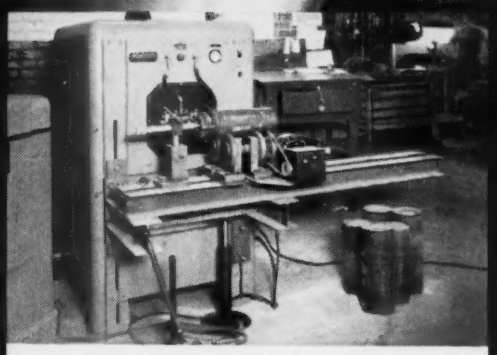
Production Doubled

Cost Cut 50%

Product Improved...

OLD METHOD

TOCCO-METHOD



TOCCO heating station with inductor and fixture for silver brazing cylinder and cylinder cap assemblies.

with TOCCO* Induction Heating

The experience of The Commercial Shearing and Stamping Company, who use TOCCO for silver-brazing hydraulic cylinder assemblies, is typical of the benefits obtained by America's leading metal-working plants who use TOCCO Induction Heating for brazing, hardening, heat-treating, forging and melting operations.

More Production with TOCCO

a. Heating time per piece cut from 15.3 minutes to 2 minutes on 5¼″ I.D. cylinder.

b. Machining and cleaning operations, formerly required, are not needed after TOCCO brazing.

Lower Costs with TOCCO

a. Through a reduction in time required for each piece.

b. Through the elimination of scrap and reworks.

c. Because, since TOCCO is automatic, operator need not be trained or especially skilled.

Improved Product with TOCCO

a. Because of better looks and sales appeal.

b. Because distortion is minimized.

c. Because of elimination of field failures due to severe stress pockets.

TOCCO Engineers — can probably find applications in your plant, too, where TOCCO Induction Heating can increase output, cut unit costs and improve your product. Such a survey costs you nothing—and may save you a great deal.

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Want to really cut costs in your cleaning room?

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CINCINNATI PD SNAGGING WHEELS

YOU can cut costs in your cleaning room—quickly and easily. Simply switch to CINCINNATI (PD) SNAGGING WHEELS, the greatest grinding wheel development in years.

CINCINNATI (PD) WHEELS will absolutely cut costs in your cleaning room . . . saving you money four important ways:

- FREER CUTTING—You can get more pounds of metal per hour with the grains and bonds specified by Cincinnati for your snagging jobs. Operators like the fast, easy cutting action of CINCINNATI (PD) WHEELS.

- SELF-DRESSING ACTION—The CINCINNATI (PD) WHEELS specified for your job by CINCINNATI abrasive engineers require few, if any, dressings. With the right grade wheel, new cutting grits are bared as soon as old grits get dull and inefficient.

- LONGER WHEEL LIFE—Through longer life of CINCINNATI (PD) WHEELS, users have reported almost *double* the production per wheel. One customer, using a portable grinder, gets almost *twice* the life with a CINCINNATI (PD) Flared Cup. Another user, snagging cylinder blocks on a swing frame, has increased the production per wheel 45% with (PD) WHEELS.

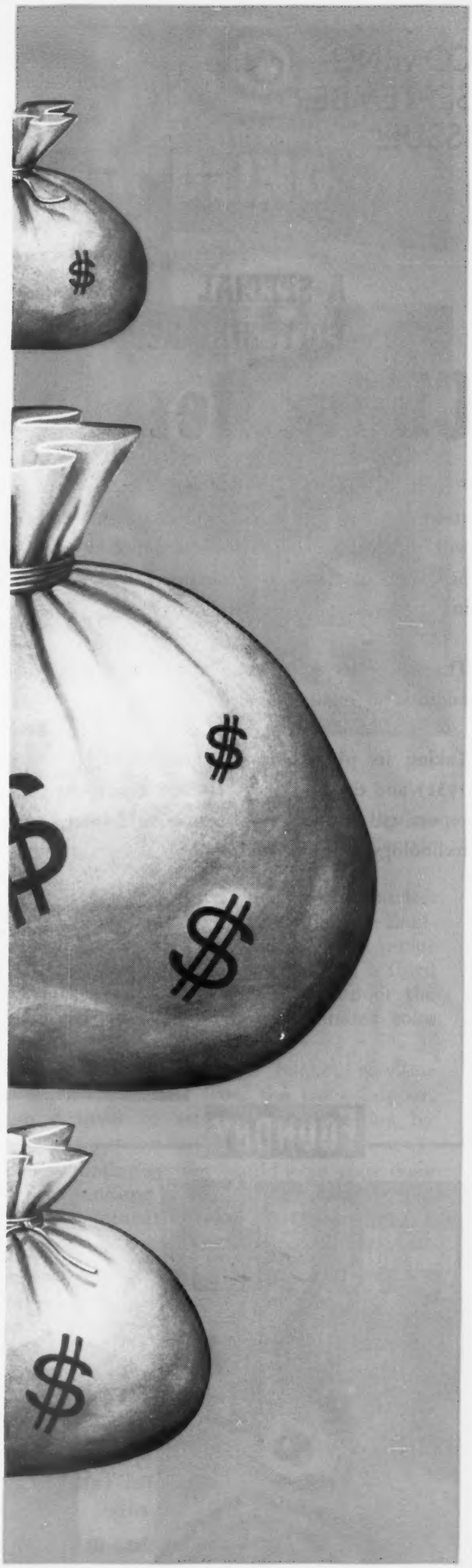
- POSITIVE DUPLICATION (PD)—"On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike.

CINCINNATI (PD) WHEELS are made in vitrified and resinoid bonds for ferrous and non-ferrous foundries and are available in a complete variety of sizes and shapes. *Yet these better, cost-cutting* CINCINNATI (PD) WHEELS *are priced no higher than ordinary wheels.*

We'll be happy to prove to you how CINCINNATI (PD) WHEELS can increase your production and cut costs and time in your cleaning room. Just contact us and we'll send one of our representatives. Wire, write or telephone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

CINCINNATI
Grinding Wheels

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.



COMING—in the SEPTEMBER ISSUE!

A SPECIAL EDITORIAL REPORT ON THE NEW

Chevrolet Tonawanda Foundry

* THE EDITORS OF FOUNDRY secured the cooperation of General Motors Corp. several months ago and will present a detailed word-and-picture story of the new Chevrolet gray iron foundry in Tonawanda, N. Y. in the forthcoming September issue.

The Chevrolet story will be told and will appear in addition to regular editorial features.

Taking its place with the Studebaker story (August 1951) and the Ford story (March 1953), the Chevrolet report will add another informative chapter to foundry technology.

SOME INTERESTING FACTS on *the new Chevrolet foundry:* now in operation, this new production foundry is operating continuously over two 8-hour shifts, employs 2,000 workers and is pouring 1,000 tons of gray iron every 16 hours. Daily production consists of 3,520 V-8 and 6 cylinder engines. The foundry is located on a 155-acre site which includes an engine plant where castings are machined and engines finished.

Sand storage for 25,000 tons of sand, 6 cupolas of 30 tons per hour melting capacity suggest the scope of the operation in the new Tonawanda plant.

Mailing date for the September issue—August 29.

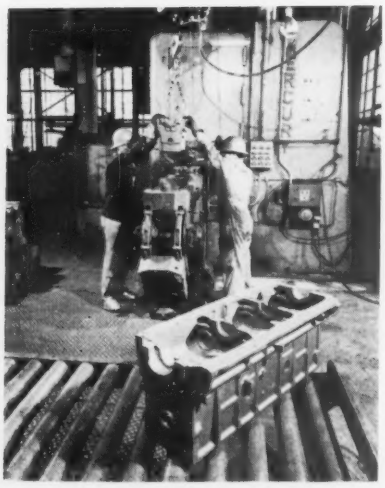
COMING SOON!

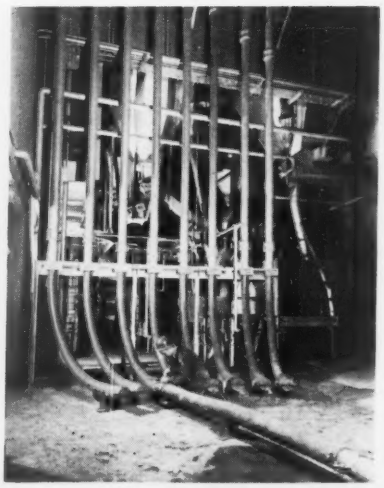
THE STORY OF LYNCHBURG FOUNDRY'S NEW SHELL MOLDING OPERATION.

ANOTHER FOUNDRY EDITORIAL AND MARKET STAFF SPECIAL REPORT — SPECIAL INVENTORY OF FOUNDRY MATERIALS HANDLING EQUIPMENT.

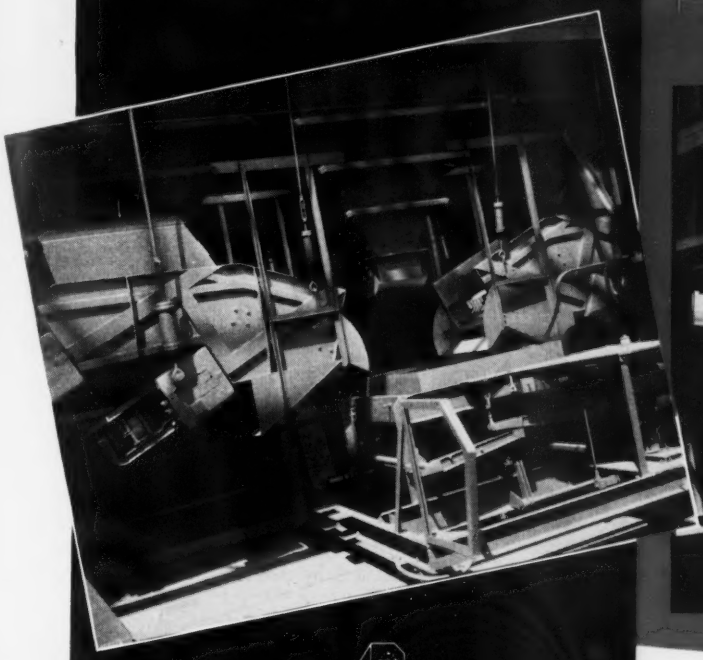
FOUNDRY

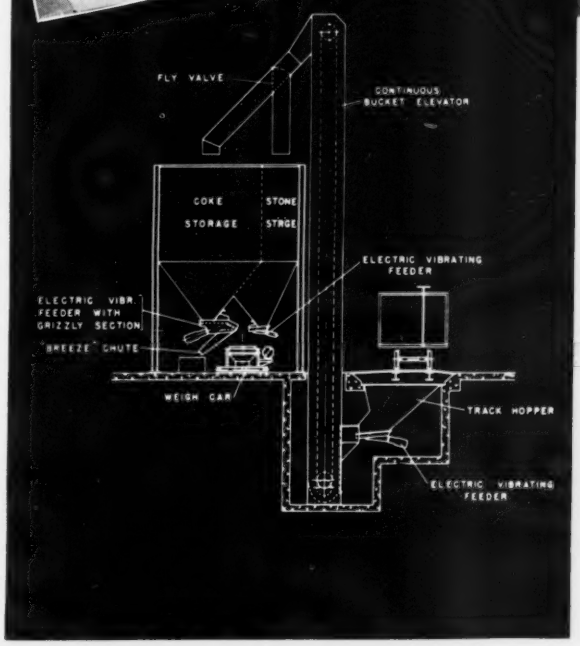
A Penton Publication, 1213 W. 3rd St., Cleveland 13, O.





COKE AND LIMESTONE UNLOADING and HANDLING





Coke and limestone unloading and handling are under absolute flow control when Jeffrey Electric Vibrating Feeders are on the job.

The simple, efficient system diagrammed at left is typical of many our competent Foundry Engineers have installed. Pan feeders work under track hopper and stone storage bin . . . a third feeder with grizzly section operates under the coke storage bin. The grizzly eliminates coke "breeze" in the charge.

The Jeffrey continuous-type bucket elevator handles both materials from the track hopper, delivering them to separate storage bins by means of a fly valve in the elevator chute.

Perhaps a similar system would ease your coke and stone handling operation. Send for Jeffrey Foundry Equipment Catalog No. 845 or write to Foundry Engineering Division, outlining your problem.

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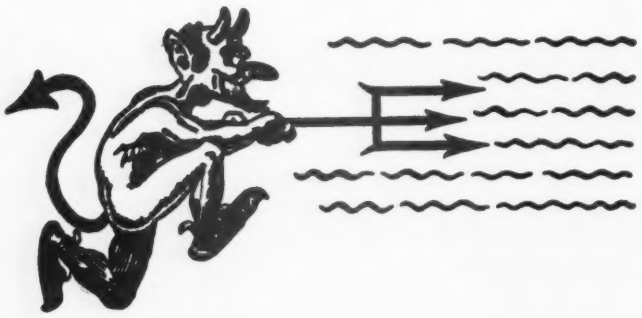
. . .IT'S A JOB FOR JEFFREY!

Produce More Castings Per Heat with



Soffel's THERMOTOMIC® "HOTOP" LIQUIDIZER

Exothermic Carbon Free Liquidizer For Iron, Steel, Nodular Iron

This new head compound saves feeding metal in risers or feeding heads which can now be reduced in height 40 to 70%

SOFFEL'S THERMOTOMIC "HOTOP" CARBON FREE LIQUIDIZER is different from other head compounds in that "HOTOP" LIQUIDIZER does NOT contain powdered metal, is NOT a thermit compound. It is a patented exothermic compound entirely free of carbon, sulfur and phosphorus and can be used without danger of contamination on any ferrous metal or alloy.

"HOTOP" LIQUIDIZER also saves molding time as less sand is needed in the mold cope due to short height of risers. "HOTOP" LIQUIDIZER produces a liquid slag well over 4000° F. of heat and insulates the metal. The feeding metal will remain liquid at least 50% longer assuring adequate feeding while the casting cools and solidifies. Piping and shrink cavities caused by premature freezing of the feeding metal are eliminated.

THERMOTOMIC HOTOP LIQUIDIZER BRAND "B" SHOULD BE USED ON RISERS UNDER 4 INCHES IN DIAMETER

GUARANTEED TO PRODUCE SOLID CLEAN CASTINGS

SOFFEL'S FAMOUS Carbon Free LIQUIDIZER FOR ALL METALS and ALLOYS

SOFFEL'S EXOTHERMIC CARBON FREE LIQUIDIZER is the leader in major foundries for use on both ferrous and non-ferrous metals and also in ingot production. It is the original scientific non-carbon, exothermic compound for feeding heads and risers.

When applied on the heads or risers, CARBON FREE LIQUIDIZER reacts within itself exothermically, producing a temperature above 3200° F. It actually increases the temperature of the feeding metal to a point well above that of the metal in the main body of the casting, thus ensuring that the feeding metal will be the last to freeze. In this manner, shrink cavities in the casting caused by premature freezing of the feeding heads will be eliminated. After the exothermic action has ceased, the LIQUIDIZER forms a soft refractory insulating blanket on the metal. This confines the heat generated by the LIQUIDIZER and aids in maintaining the desired high temperature of the feeding metal in the heads or risers.

SOFFEL'S THERMOTOMIC COMPOUND

PATENTED

FOR ALL METALS and ALLOYS

THERMOTOMIC COMPOUND is a patented Exothermic compound that can be molded into any desired shapes and used as feeding ring inserts under risers or as facing application where it is desired to maintain fluidity of the casting metal. THERMOTOMIC permits reversal of the trend towards large feeding heads and risers, making it possible to use heads that are shorter and more compact with 1½" feeder openings.

This permits easy removal of the casting feeding heads and sharp reductions in cleaning and finishing costs. When THERMOTOMIC is used as inserts or as facing mixing with molding sand in the mold, heat at thin metal sections is retained until the thick main body of the casting has solidified, thus eliminating shrink cracks and improving grain structure and tensile strength. For use in green sand molds, use THERMOTOMIC W. P. (Waterproofed)

NOTE: SOFFEL'S CARBON FREE LIQUIDIZER NO. 5 is recommended for use on top of feeding heads in conjunction with THERMOTOMIC COMPOUND. For aluminum castings, use THERMOTOMIC ABC and AL-X31 LIQUIDIZER. When ordering a trial sample, advise the kind of metal to be used on.

U. S. Patents No. 2,490,327 and No. 2,500,097

PITTSBURGH METALS PURIFYING COMPANY

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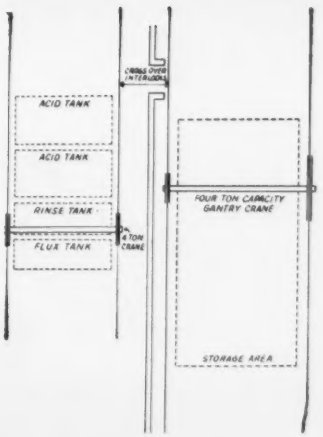
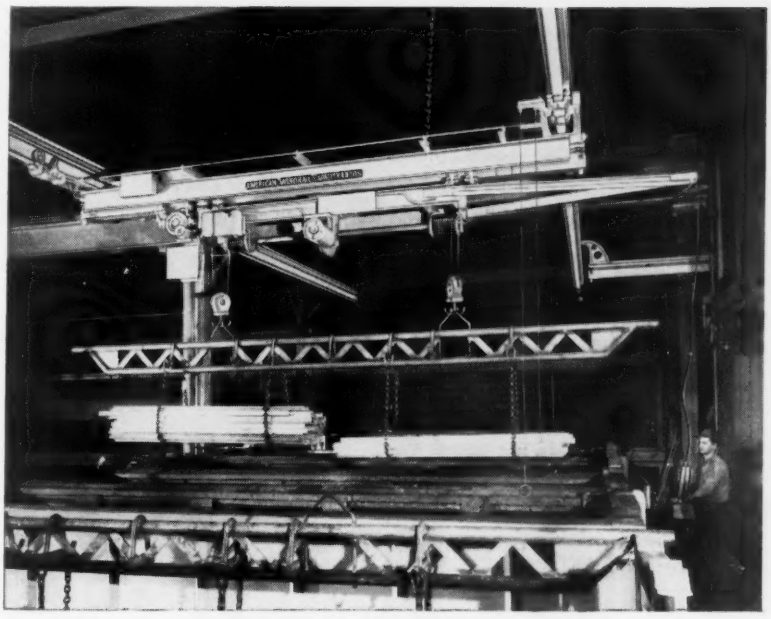
WORLD'S LARGEST MANUFACTURER OF FLUXES AND PURIFIERS FOR ALL METALS AND ALLOYS



AMERICAN MONORAIL GANTRY CRANE SYSTEM *speeds galvanizing!*



Steel fence posts travel from fabrication to galvanizing over a gantry bridge which interlocks at a crossover track through doorway for passage to the MonoRail crane serving the tanks in the plating room.

All travel on the 4-ton system is motor operated and controlled by push-button station in the operator's hand.

Here is truly team-work handling that results in cost savings as well as increased tonnage through the galvanizing process. It is a typical example of American MonoRail engineering available at no obligation for the solution of your handling problems.

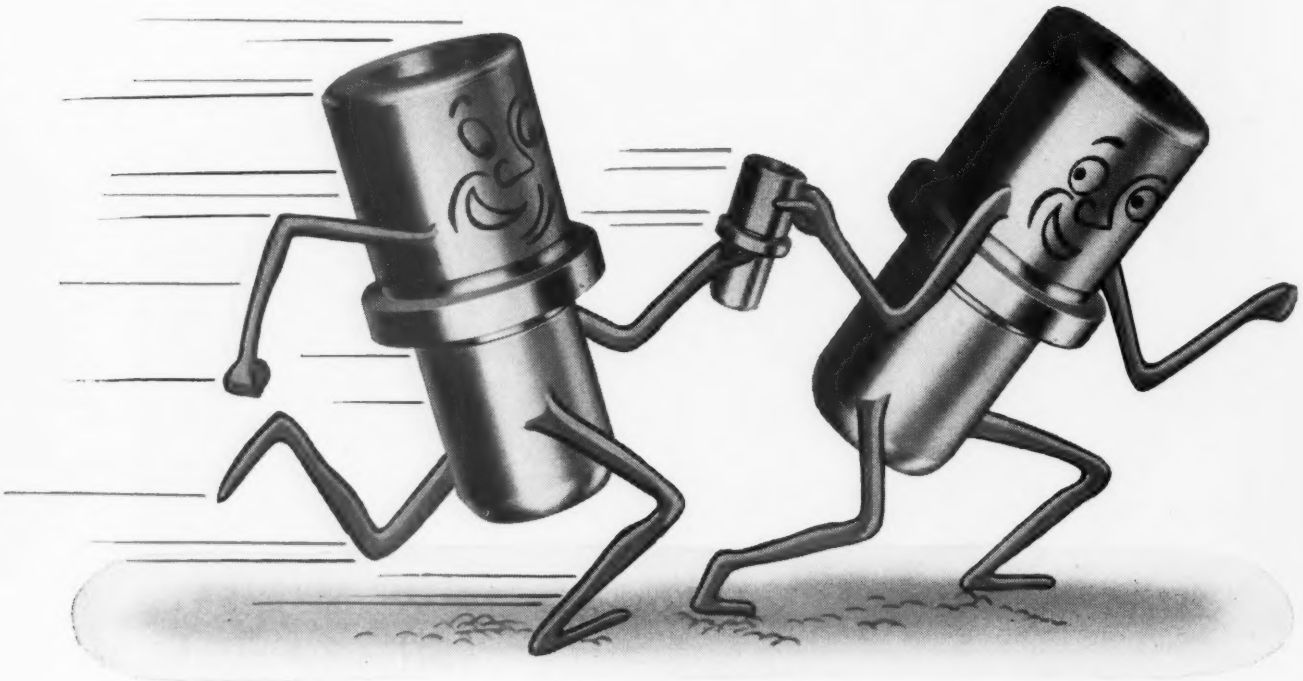
Send for Bulletin C-1 illustrating hundreds of successful Mono-Rail installations.

AMERICAN OVERHEAD HANDLING EQUIPMENT

AMERICAN MONORAIL COMPANY

13104 ATHENS AVENUE • CLEVELAND 7, OHIO

QUICK CHANGE WITH UNIVERSAL STANDARD PRESS-FIT FLASK PINS AND BUSHINGS

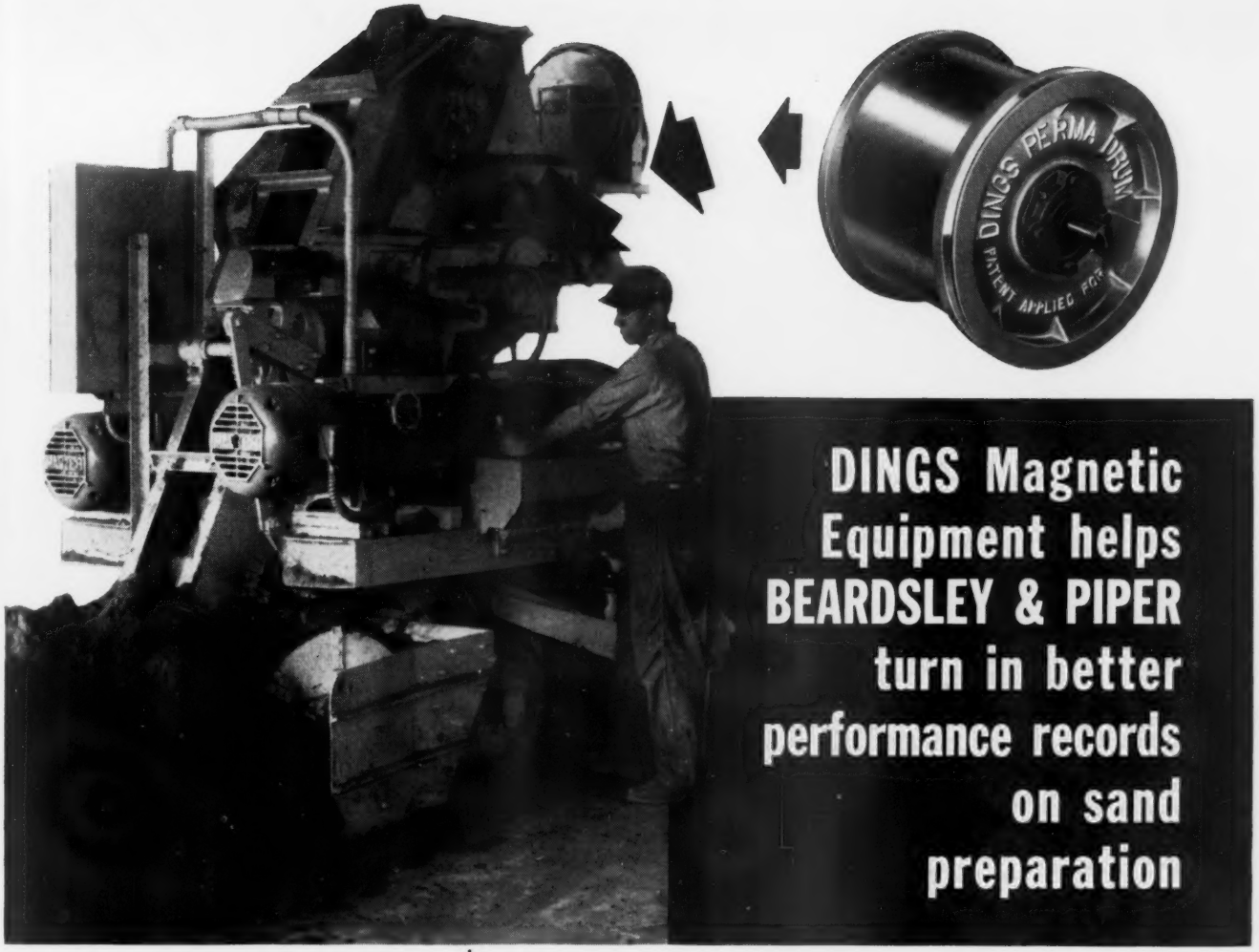


To compensate for wear in the ear holes of cope and drag, standard size Universal Press-Fit Flask Pins and Bushings are available with three different outside diameters, the second slightly larger than the original size and the third slightly larger than the second. Thus, as the ear holes increase in size—and replacement of the original pins and bushings becomes necessary—pins and bushings with a larger outside diameter are available to provide a good, tight fit in the larger ear holes without welding or other expensive, time-consuming operations. Just drive out the old, press in the new . . . truly "quick change"!

Universal Flask Pins and Bushings of all types are available in a complete range of sizes as regular stock items. Plain, taper, threaded or hexagonal series. For complete information, write to Universal Engineering Sales Co., 1060 Broad St., Newark 2, N. J.; 5035 Sixth Ave., Kenosha, Wis.; or the home office.

186

UNIVERSAL ENGINEERING COMPANY FRANKENMUTH 4, MICHIGAN

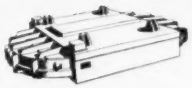


DINGS Magnetic Equipment helps BEARDSLEY & PIPER turn in better performance records on sand preparation

DINGS *line includes:*

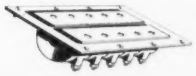
Electric and non-electric magnetic pulleys

Non-electric magnetic drums



Type RM rectangular suspended magnet

Lifting magnets



Non-electric PERMA-PLATE magnets

BEARDSLEY and PIPER know that *complete* sand preparation includes *complete* magnetic separation . . . and to make sure of top-notch performance, this progressive company uses DINGS electric and non-electric magnetic pulleys and drums in its modern line of sand preparation units such as their "NITE-GANG" shown above.

DINGS offers the foundry industry the newest, most complete line of magnets and magnetic separators made . . . from low cost Alnico Perma-Plates to rugged lifting magnets and the most powerful self-cleaning rectangular magnet ever built . . . for pulling large and long pieces of tramp iron from deep burdened, fast moving belts.

Let your nearest DINGS representative tell you about the latest developments in magnetic equipment for foundries . . . or mail the coupon for further details.

Dings

DINGS MAGNETIC SEPARATOR CO.
4708 W. Electric Ave., Milwaukee 46, Wis.

MAIL THIS COUPON TODAY

DINGS MAGNETIC SEPARATOR CO.
4708 W. Electric Ave., Milwaukee 46, Wis.

PLEASE SEND ME CATALOG C-5000-B.

NAME_____

TITLE_____

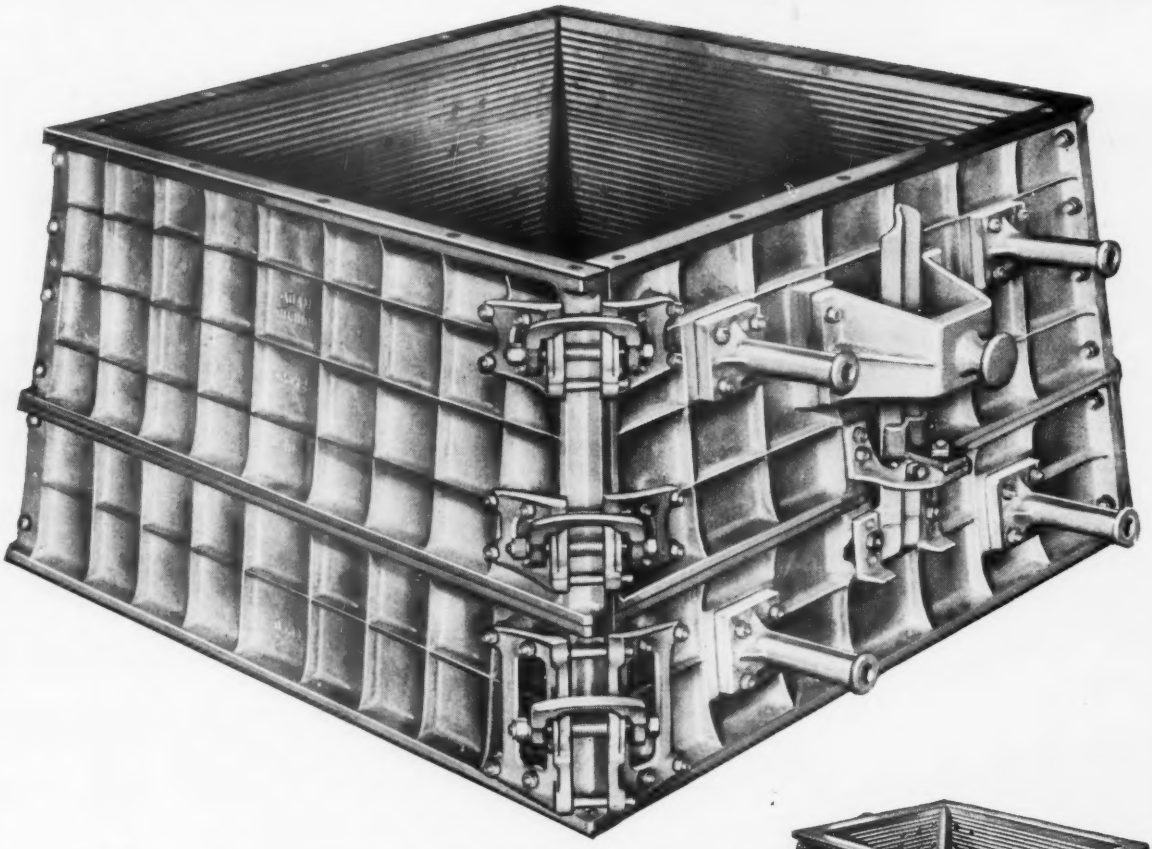
FIRM_____

ADDRESS_____

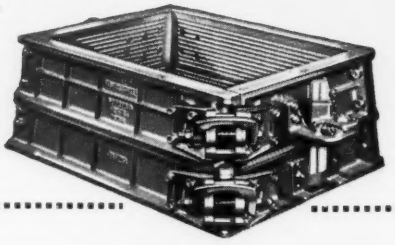
CITY_____ ZONE___ STATE_____

PD155

Adams Aluminum Easy Off Flasks



Large or Small



Used with ADAMS JACKETS cast iron or aluminum

Assures you another winning combination from the most complete line of quality flask equipment.

Write us today for further information. Let Adams help you analyze your flask equipment problems.

The ADAMS Company

ESTABLISHED 1883

MOLDING MACHINES and FLASK EQUIPMENT

700 FOSTER STREET, DUBUQUE, IOWA, U.S.A.

Judge for yourself the advantages of

VANCORAM FERROVANADIUM

packed in bags

Look for the blue product marking which is the identifying color for Vanadium in Vancoram's original color coding system.

Each of these bags contains 25 lbs. of vanadium for handy cost-saving additions to furnace, cupola or ladle.

SAVES TIME AND MONEY—You don't have to weigh prior to alloy addition. Each bag contains exactly 25 lbs. of vanadium. Thus you save on handling costs.

CONTAMINATION AND WASTE ELIMINATED—The ferrovanadium is confined to its own bag . . . made of strong, white, cotton fabric with a crepe-paper interlining that's adhered to the outer covering with a special moisture-resisting adhesive. Bags eliminate waste common to other types of packing.

INVENTORY AND HANDLING PROBLEMS SIMPLIFIED—Standard weight of each bag means quicker inventory. Palletized shipments can be handled quickly and easily by fork truck or crane. Each bag is clearly labeled for ready identification.

UNIFORMLY HIGH-GRADE MATERIAL—Vancoram ferrovanadium is produced under strictest quality control and thus is guaranteed to be physically clean and of uniform high quality.

Bagged ferrovanadium is another example of the way VCA works to help steelmakers make better metals faster—and at lower cost. Contact your VANADIUM CORPORATION representative for further information on Vancoram ferro alloys.

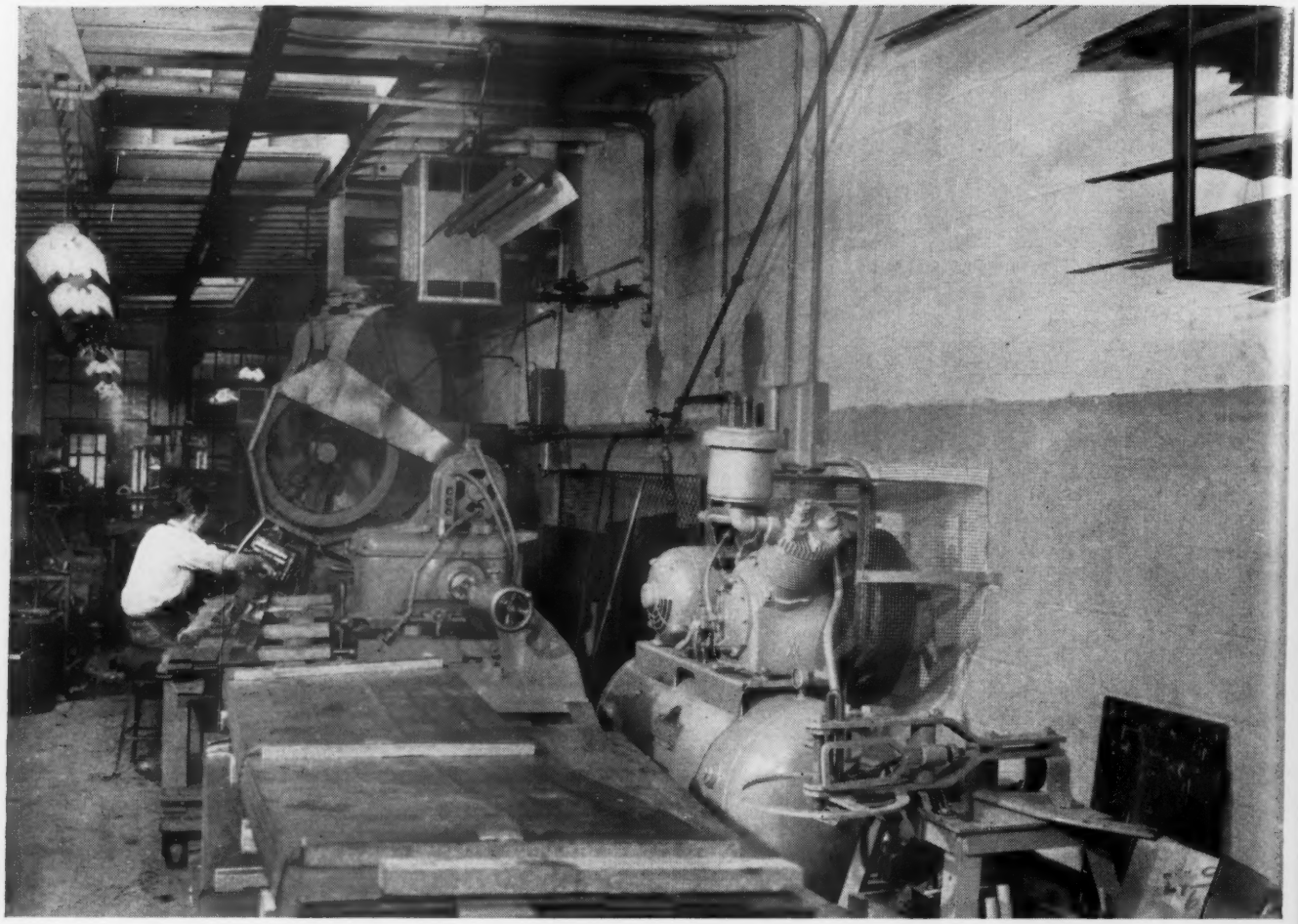
VANADIUM CORPORATION OF AMERICA

420 Lexington Avenue, New York 17, N. Y.

Detroit · Chicago · Pittsburgh · Cleveland

VANCORAM

Producers of alloys, metals and chemicals



Punching Out Extra Profits

Dependable Westinghouse Air Compressor supplies versatile, economical air power to raise production and lower costs

That's just what the operator of this punch press is doing — punching out the extra profits that result from increased production.

And it's a Westinghouse Air Compressor that's responsible for his greater output.

Why? Because Westinghouse Air Compressors have 15 features not found in any other compressor — features that mean greater dependability and greater efficiency for low-cost operation. Here they are:

Type M inlet filter, disc valves, enclosed crankcase, anti-friction main bearings, pressure lubrication, low oil level protection, enclosed starting unloader, adequate cooling fins, "Y" type construction, high velocity fly-wheel fan, large size intercooler, thermal overload protection, greater weight, dual control, and one-year warranty period.

Let compressed air help you punch out those extra profits with its versatility. And guarantee yourself a trouble-free source of supply by using Westinghouse Air Compressors. Sizes up to 40 hp — write for latest literature.

W-102

LE ROI *Division of Westinghouse Air Brake Co.*

Milwaukee 14, Wisconsin

PORTABLE AIR COMPRESSORS

TRACTAIR

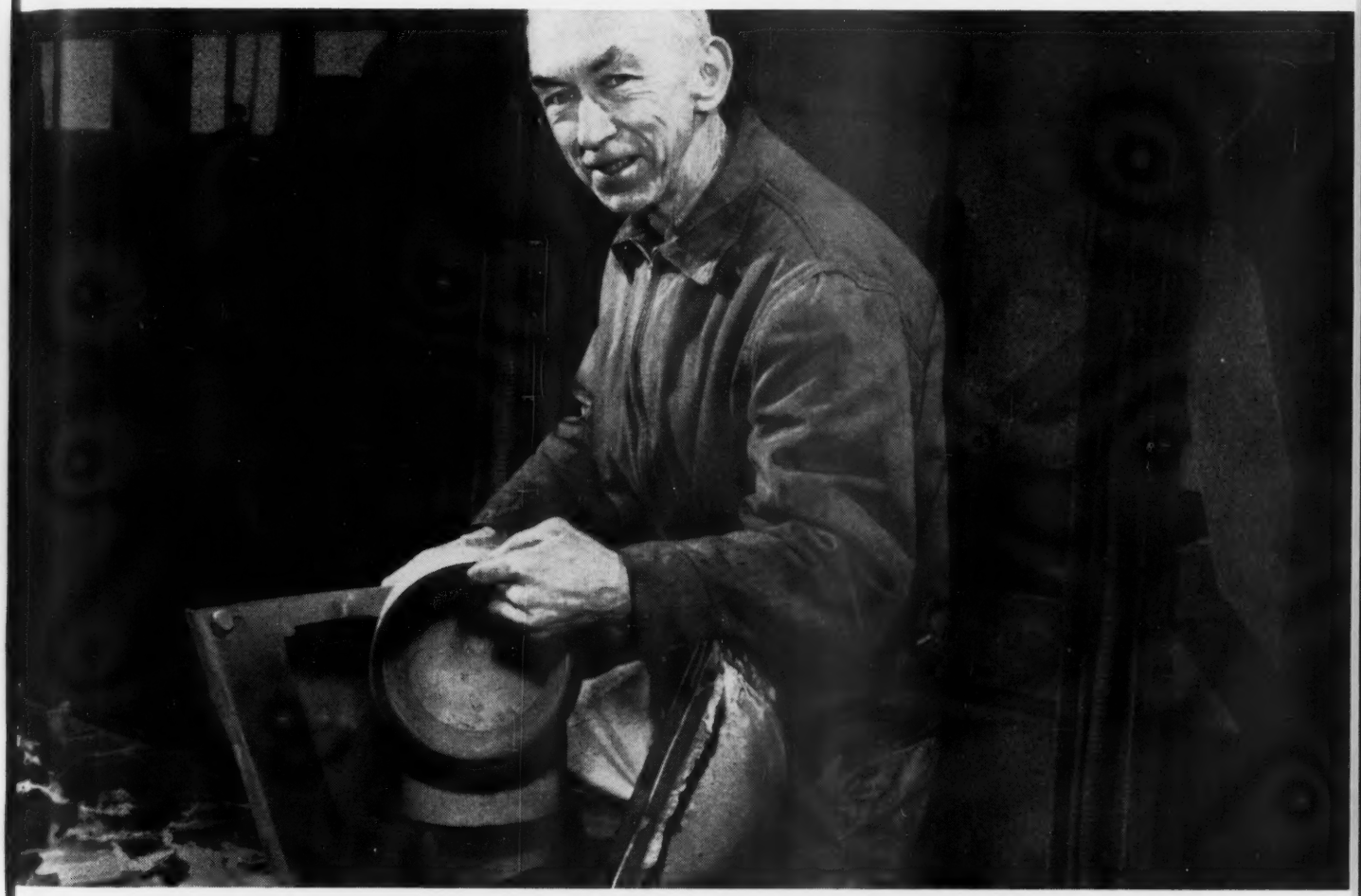
STATIONARY AIR COMPRESSORS

AIR TOOLS

ENGINES

MONSANTO PROFIT PICTURES

You get stronger shell molds... higher density... with Resinox 736



Traditional finishing costs are being converted to profits with Resinox 736 at Murphy Shell Mold and Casting Co., Morral, Ohio.

MONSANTO'S PHENOLIC RESIN PRODUCES CASTINGS WITH SMOOTHER, FINER FINISH

Strong, dense molds are the secret of quality castings. It means you can concentrate more sand in each square inch, which results in a smooth, almost flawless surface in the finished piece.

Resinox 736 will give you this advantage. It has been specifically developed for precision casting work. This means elimination of blisters, scabs and sand crust which have to be machined or ground away when other methods or materials are used.

At the Murphy Shell Mold and Casting Co., where Resinox 736 is used exclusively as a shell binder, this advantage has amounted to "a 20% gain in production and an 80% reduction in cleaning costs."

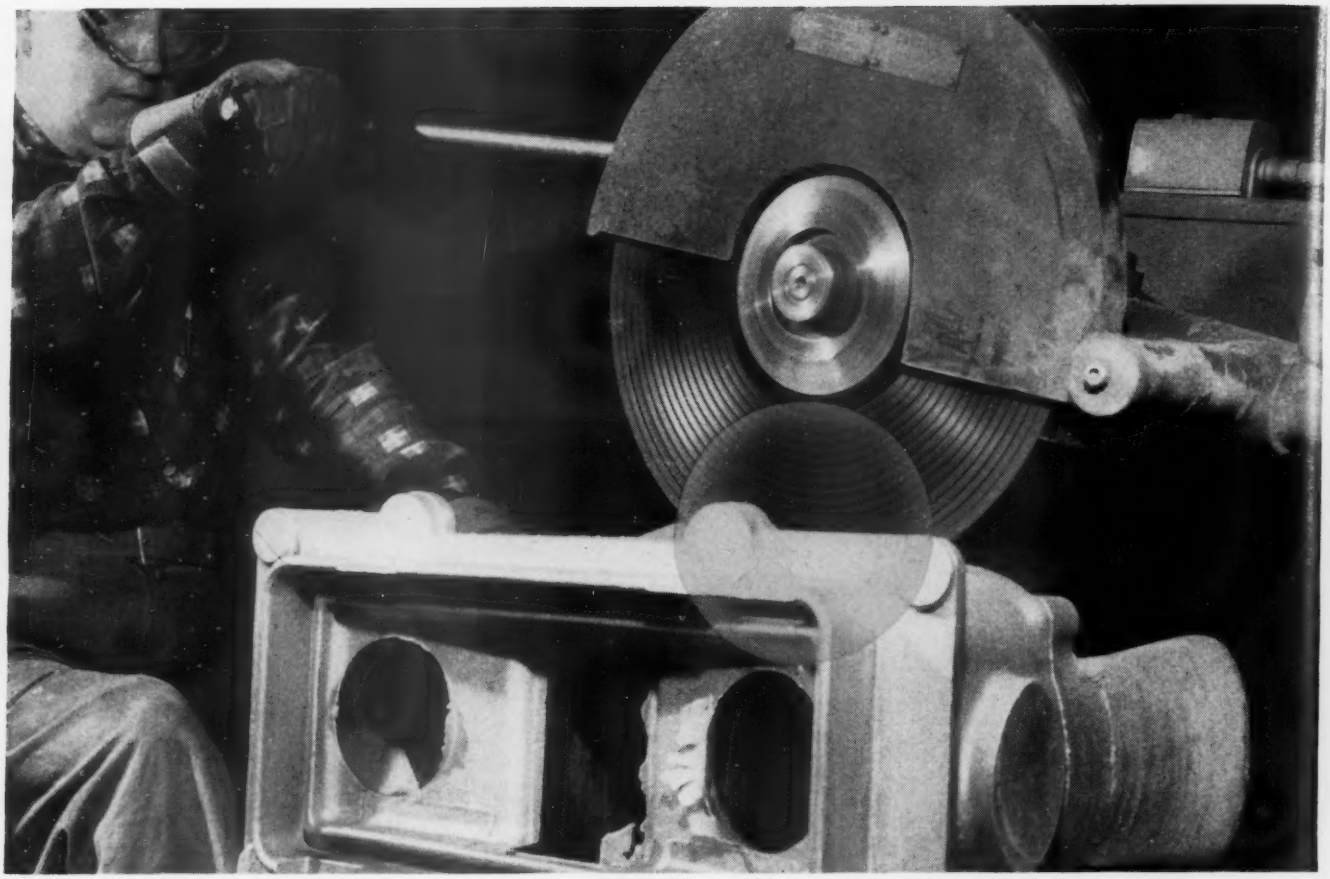
If excessive machining and finishing requirements are hurting your profit picture, try shell molds bonded with Resinox 736 phenolic resin.

For a complete line of shell molding, core binding and sand conditioning resins that are research-developed and shop-tested to meet your foundry needs, write first to Monsanto Chemical Company, Plastics Division, Dept. FO-7, Springfield 2, Mass.

For stronger shell molds, specify

RESINOX®

MONSANTO®



CUTTING-OFF IS ONE OF MANY BN APPLICATIONS. This glass cloth-reinforced wheel — one of the safest and longest lasting in industry — is also a cost-cutting "Touch of Gold" performer for snagging, slotting, notching, etc.

You can do—and save—a lot with the BN!

Popular Norton Reinforced Wheel brings the profit-building "TOUCH of GOLD" to many different jobs

Strength, safety and versatility are the reasons why the Norton BN reinforced wheel is one of the foundry industry's most valuable production tools.

This straight wheel is strong and safe because of its resinoid bonded, glass cloth-reinforced structure that assures high resistance to breakage.

You'll find the BN unequalled for cutting-off gates and risers on non-ferrous castings, on both stationary and swing-frame machines. On portable grinders, bench stands and floor stand grinders you can use it for nicking gates and risers and slotting — also, for light snagging and cleaning of both ferrous and non-ferrous castings.

And it will do all these jobs for you with the fast cutting action, low rate of wear and wide margin of safety that add up to money-saving "Touch of Gold" performance.

See your Norton Distributor about a demonstration of the BN and other Norton reinforced wheels in your foundry. Ask him for the big new reinforced wheel catalog with net prices. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone book, yellow pages. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

W-1656

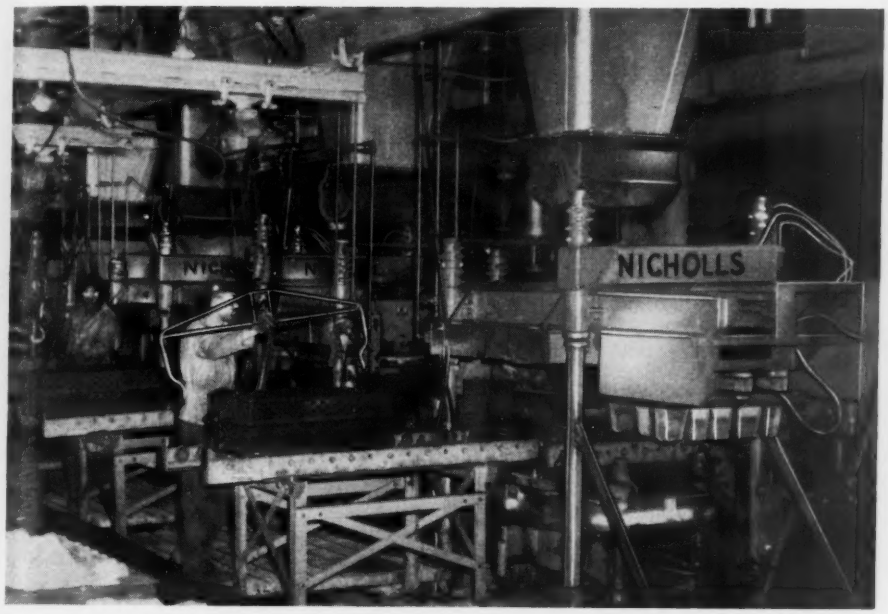
NORTON *Making better products... to make your products better*

and its BEHR-MANNING division

NORTON COMPANY: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING DIVISION: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes

FACT REPORT:

NICHOLLS MOLDING MACHINES are made to **last!**



A battery of NICHOLLS "push button" automatic molding machines in a large foundry.

here's why:

- **"Push-button" automatic control to eliminate dangerous risks.**
- **Precision-built for years of service.**
- **Quality construction for finer molds continuously.**
- **Fully automatic operation.**
- **Greater molding economy than you've ever known.**

Manufacturers have depended on Nicholls equipment for **45 years**

There must be a reason why so many of the country's top manufacturers choose Nicholls equipment. And there is. It's the same reason why you will want to specify Nicholls Jolt-Squeeze and Pattern Draw Molding Machines—Ease and economy of operation, low maintenance costs—and the best possible molds every time.

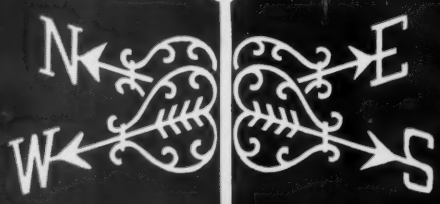
For complete information, write:

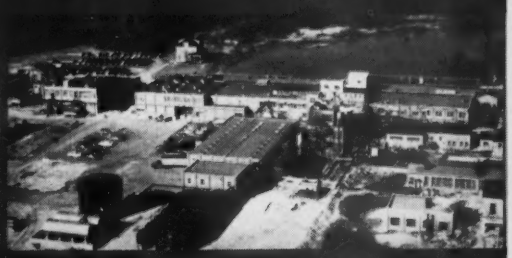
WM. H. NICHOLLS CO., INC., RICHMOND HILL 18, LONG ISLAND, NEW YORK.

NICHOLLS

CATALIN

UREA AND PHENOLIC Shell and Core Binders





FORDS, NEW JERSEY

CALUMET CITY, ILLINOIS

THOMASVILLE, NORTH CAROLINA

FAST DELIVERIES!

From three strategically located plants... Catalin Service *Speeds* Quality—in Quantity!

Catalin, pioneer producer of an extensive range of urea, phenolic, cresylic, resorcinol, melamine and styrene formulations . . . is proud of its product reputation, and prompt service from all three of its modern processing plants: these as pictured hereon are most desirably located in the East, Midwest and South.

For the foundry industry, Catalin produces a group of fast curing, Urea and Phenolic Resins (liquid and powder) as binders for shell molds and sand cores. Serving both ferrous and nonferrous metal castings, these thermosetting formulations are developed to meet specific foundry requirements.

Catalin field representatives, experienced in the problems of the foundry industry, welcome the opportunity to discuss the superior advantages of Catalin Foundry Resins. Inquiries invited!

Catalin

CATALIN CORPORATION OF AMERICA
ONE PARK AVENUE, NEW YORK, N. Y.

branch offices:
CHICAGO, ILL., 221 No. LaSalle Street
GREENSBORO, N. C., 630 Southeastern Bldg.

BEFORE THIS

COMES THIS

Every ton of Southern Ohio Fire Clay mined by Cedar Heights is intensively refined by our time-tested methods. In the picture, crude clay is entering the feeder at left. Mullers reduce it to a semi-fine state. The clay is then electrically screened to size to meet customer specifications. Every step is rigidly controlled to insure a high-quality product. Plasticity, high refractory value, and smooth, clean texture are important features of Cedar Heights Fire Clay.

Write for free sample.
Also available in bulk lots.

CEDAR HEIGHTS CLAY COMPANY

50 PORTSMOUTH ROAD
OAK HILL, OHIO

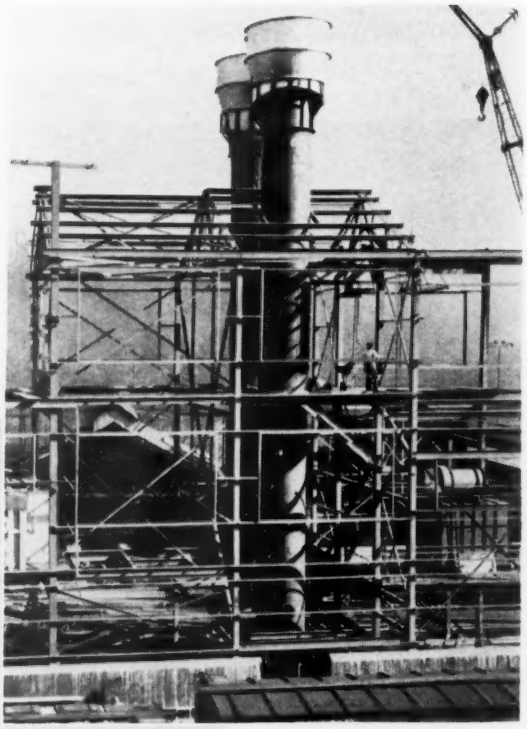
BUILT-IN ECONOMY

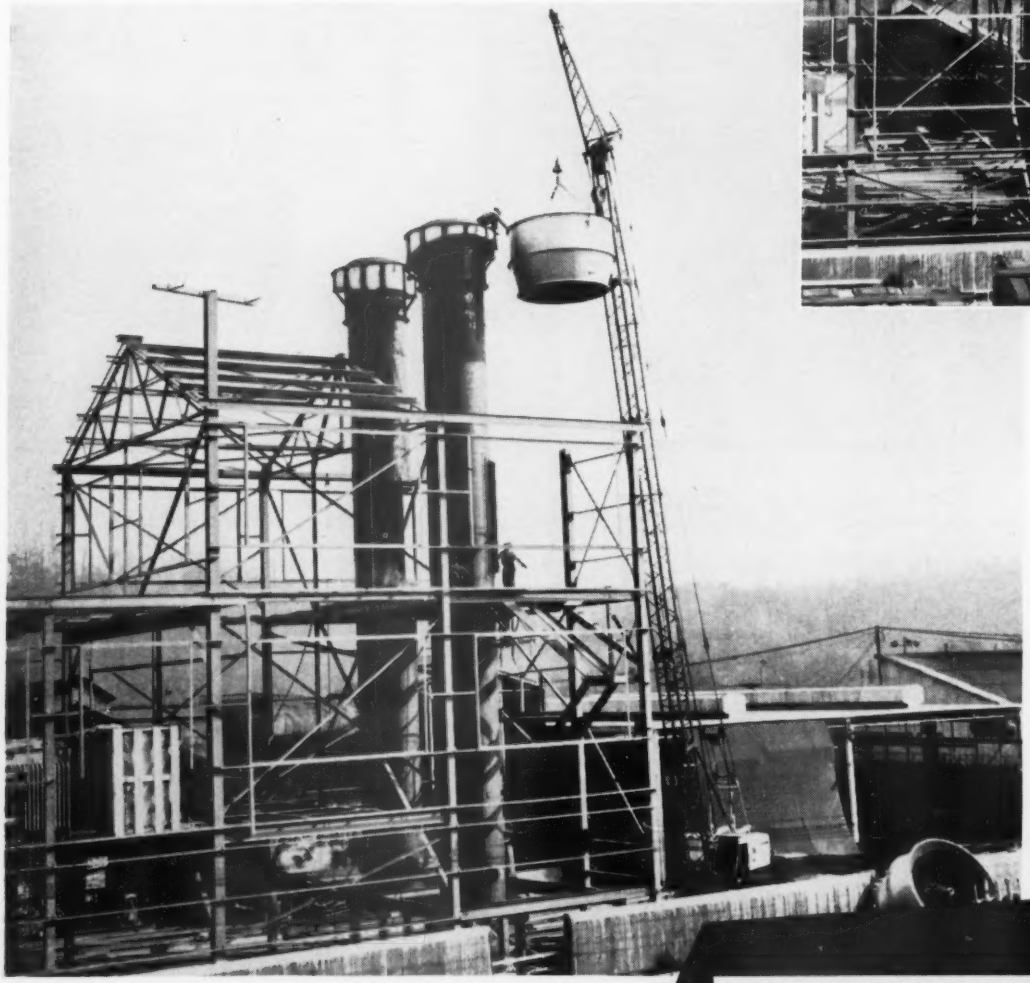
Like Lynchburg Foundry, you too, can save from the start by including Schneible Cupola Collectors in your plans RIGHT NOW!

The Lynchburg Foundry Company planned this new addition to save time and money. Installation of these Schneible Cupola Collectors was accomplished easily and economically with equipment already on the job for other structural work. No extra expense was necessary.

Further savings will be made from the start, because the Schneible Collectors will keep fly-ash and fumes from deteriorating roofs, gutters and other facilities thus extending the useful life of all original equipment.

Like Lynchburg, why not include Schneible "SW" Cupola Collectors and Multi-Wash Collectors in your plans and save right from the start.





Photos shown, "Courtesy of The Iron Worker, Lynchburg Foundry Company, Lynchburg, Virginia."

Cupola Collectors are "SW" type known throughout the industry as the most efficient and most economical wet method collectors available. Non-clogging distribution head, reuse of water and absence of moving parts mean practically no maintenance is required.

SCHNEIBLE

CLAUDE B. SCHNEIBLE COMPANY
P. O. Box 81, North End Station • Detroit 2, Michigan

Cable Address: CBSCO
European Licensee: Elex S. A., Zurich, Switzerland

Late News

NEW MOLD MATERIAL: A process for making precision metal castings in glass molds will be introduced soon. The mold is produced from a 96 per cent glass powder which is mixed with water. A glass shell is built to the desired thickness in a porous plaster mold. Reports indicate that high temperature alloys up to 3300° F can be cast in this mold. Excellent surface finish of the casting and tolerances in small castings of ±0.01 in. across the parting line are claimed.

PIG IRON PRICES: Foundrymen probably will pay more for pig iron shortly, due to higher wage rates in the steel industry and higher costs of materials. A year ago when steel labor costs went up with an accompanying increase in steel prices, the market for pig iron remained unchanged due principally to a severe lag in demand. Pig iron producers indicate they cannot absorb a second wage hike and increased ore prices made earlier in the year.

SFSA TO MOVE: The Steel Founders' Society will move its office to 606 Terminal Tower Building, Cleveland 13, on Aug. 4.

REOPEN FOUNDRY: After the Eaton Mfg. Co. late in May announced it would close its Vassar, Mich., plant, the AFL United Auto Workers accepted a 61-cent hourly wage cut. On June 24, the company announced that the foundry would be reopened Aug. 1 "on a necessarily—and it is hoped temporarily—reduced basis."

METALLURGICAL TRAINING: American Society for Metals has created a Metals Engineering Institute, which will offer over 40 metals engineering courses designed to provide working metallurgical knowledge for men in metals industries who do not have formal education in those fields. Anton deSales Brasunas, associate professor of metallurgical engineering, University of Tennessee, has been appointed to the newly created post of Director of Educational Activities to handle organization and production of the courses. Work on the courses already is in progress under direction of Prof. Lou Haller, chief, Mineral Extension Courses, University of Pennsylvania, who has been loaned to ASM to initiate the educational activity.

FORD FOUNDRY: Expansion of the Cleveland foundry of Ford Motor Co., (FOUNDRY for June, page 165) will include a major realignment of production facilities and construction of a 70,000 sq ft addition. This will permit that foundry to supply all castings for the two Cleveland engine plants, and a portion of the castings for a new engine plant to be built at Lima, O. The additions and realignment of facilities are expected to be completed early in 1957.

NONFERROUS STATISTICS: According to a Bureau of Census report (released after "Foundry Statistics," page 197, went to press) April shipments of nonferrous castings totaled 233 million lb compared with 247 million lb in March. The April total consisted of 84 million lb of copper base castings, 73 million lb of aluminum castings, 72 million lb of zinc castings, 2.6 million lb of magnesium and 1.6 million lb of lead die castings. Unfilled orders of nonferrous castings for sale at the end of April totaled 249 million lb, 3 per cent above the backlog at the end of March.

PERSONALS: John A. Rassenfoss has been appointed manager, Manufacturing Research Laboratory, American Steel Foundries, Chicago, and C. G. Mickelson and P. J. Neff have been made assistant managers . . . Samuel M. Felton has been named president, American Car & Foundry Division, ACF Industries Inc. . . . Arthur S. Bowes has been elected chairman, Franklin B. Schmick, chairman of executive committee and Harry J. Hemingway, president, Advance Aluminum Castings Corp., Chicago.

MALLEABLE FOUNDERS ELECT: Carl L. Liebau, president and treasurer, Federal Malleable Co., West Allis, Wis., was elected presi-

dent of the Malleable Founders' Society at the annual meeting June 16-17. Leon J. Wise, vice president, Chicago Malleable Castings Co., Chicago, was elected vice president; Dudley V. Walker, managing director, Eberhard Mfg. Co. Division, Eastern Malleable Iron Co., Cleveland, was re-elected treasurer and Lowell D. Ryan, Cleveland, secretary-managing director. (Report of meeting will appear in August issue.)

SBA LOAN: Small Business Administration has approved a bank participation loan in the amount of $150,000 to C. I. Capps Co., Jacksonville, Fla., operator of a gray iron and brass foundry employing 135.

BUSINESS: June business continued good, according to a survey of members of the National Association of Purchasing Agents. However, there are indications of a leveling trend. Only 36 per cent report increased production and 33 per cent increased orders. In contrast, only 7 per cent on production and 14 per cent on new orders report a situation lower than last month. Although, generally speaking, commodity prices are keeping within a narrow range, purchasing agents report most changes are upward. Inventories of industrial purchased materials continue to increase, resulting largely from higher production schedules and deliberate planning of bigger stocks of materials. The association points out that this willingness to add to stock is further evidence that production will continue at a fairly high rate in the period immediately ahead.

MISCELLANY: Stroh Die Molded Casting Co. will build a new 35,000-sq-ft plant costing between $300,000 and $400,000 at 11123 West Burleigh St., Wauwatosa, Wis. . . . The next President's Conference on Occupational Safety will be held in Washington, May 14-16, 1956 . . . During first five months of 1955, orders for machine tools totaled $310.1 million, a gain of $76.9 million over the corresponding period in 1954 . . . For the first time on record, foundries of the United Kingdom produced more than 1 million tons of gray iron castings in the first quarter. Output was 1,018,000 tons, 2 per cent above the previous peak and 5½ per cent above first quarter of 1954.

Prices of Foundry Metals and Coke

(As of June 27, 1955)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE	
Connellsville	$16.50-17.00
OVEN	
Birmingham	$22.65
Buffalo	25.00
Chicago	24.50
Detroit	25.50
Erie, Pa.	25.00
Indianapolis	24.25
Kearny, N. J.	24.50
Lone Star, Tex.	18.50
Milwaukee	25.25
Montreal, Que.	26.25
New England, deld.	26.05
Painesville, O.	25.50
Philadelphia	24.00
Portsmouth, O.	24.00
St. Louis, del.	26.00
St. Paul	24.25
Swedeland, Pa.	24.00
Terre Haute, Ind.	24.05

PIG IRON

(Per gross ton f.o.b. furnace)

	No. 2 Foundry	Malleable
Bethlehem, Pa.	$58.50	$59.00
Birmingham	52.88	....
Buffalo	56.50	57.00
Chicago	56.50	56.50
Cleveland	56.50	56.50
Duluth	56.50	56.50
Erie, Pa.	56.50	56.50
Everett, Mass.	61.00	61.50
Fontana, Calif.	62.50	....
Geneva, Utah	56.50	....
Granite City, Ill.	58.40	58.90
Lone Star, Tex.	52.50	52.50
Neville Island (Pittsburgh)	56.50	56.50
Steelton, Pa.	58.50	59.00
Swedeland, Pa.	58.50	59.00
Toledo, O.	56.50	56.50
Troy, N. Y.	58.50	59.00
Youngstown, O.	....	56.50

NONFERROUS INGOT

(Cents per pound, carlots)

BRASS AND BRONZE: Red brass, No. 115, 34.50; tin bronze, No. 225, 45.00; No. 245, 39.75; high-leaded tin bronze, No. 305, 38.00; No. 1 yellow, No. 405, 29.25; manganese bronze, No. 421, 31.75.

ALUMINUM: 99 per cent plus, primary ingots 23.20. Secondary No. 12 alloy 25.50. Deoxidizing grades: No. 1 26.50-27.25; No. 4 24.00-24.75.

MAGNESIUM: 99.8 per cent notched ingots 29.25, f.o.b. Freeport, Tex. (10,000 lb or more).

COPPER: Electrolytic 36.00, delivered Connecticut valley.

ZINC: High grade 13.85, delivered. Die casting alloy No. 3 16.50, delivered.

IRON AND STEEL SCRAP

(Consumer prices per gross ton delivered, except as otherwise noted)

	No. 1 Heavy Melting Steel	No. 1 Cupola Cast	Heavy Breakable Cast	Clean Auto Cast	Machinery Cast	Malleable	Short Steel Rails
Birmingham	$32.00-33.00	**$45.00-46.00	.....	.....	.....	.....	$45.00-46.00
Boston*	**27.00-29.00	**19.00-20.00	.....	.....	**34.00-35.00	.....	.....
Buffalo	29.00-30.00	**36.00-37.00	.....	.....	**41.00-42.00	.....	42.00-43.00
Chicago	33.00-35.00	41.00-42.00	.....	45.00-46.00	45.00-46.00	45.00-46.00	49.00-51.00
Cincinnati*	**31.00-32.00	**39.00-40.00	**35.00	.....	**45.00-46.00	.....	47.00-48.00
Cleveland	32.00-33.00	43.00-44.00	33.00-34.00	44.00-45.00	44.00-45.00	44.00-45.00	49.00-51.00
Detroit*	**27.50	**37.00	**28.00	**42.00	.....	**35.00	.....
Los Angeles	30.00	**42.00-44.00	.....	.....	.....	.....	.....
New York*	30.00-31.00	31.00-32.00	33.00-34.00	.....	.....	.....	.....
Philadelphia	37.00-37.50	36.00	41.00	.....	44.00-45.00	45.00	.....
Pittsburgh	34.00-35.00	39.00-40.00	34.00-35.00	.....	43.00-44.00	.....	49.00-51.00
St. Louis*	30.00	40.00	33.00	43.00	.....	.....	46.00
San Francisco	30.00	40.00-43.00	36.00	39.00	48.00	.....	.....
Seattle	33.00	**36.00-40.00	**28.00	.....	.....	.....	.....

*Brokers' buying prices. ** F.o.b. shipping point.

HYGEIA SEACOAL WINS BY 800 TO 1 IN DUST COUNT TEST by Independent Industrial Health Laboratory

Keep Your Foundry Dust–Free. Enjoy These Positive Advantages

1 Permanently dust-free

2 Cleaner Handling

3 Less material lost

4 Better Volatile Sooting . . . Better Peel

5 More economical

Ask for a demonstration of our SCATTER PATTERN TEST showing the marked difference in dustiness between Hygeia Seacoal and ordinary seacoal

Write for Literature

"A dust count was made by the impinger method with the following results:

Samples collected from 5½ to 10½ minutes after dispersion —

416 million particles of Regular Seacoal per cu. ft. of air.

½ million particles of HYGEIA SEACOAL per cu. ft. of air."

(This means 800 particles of Regular Seacoal in the air or up exhaust to 1 particle of HYGEIA SEACOAL

"Samples collected from 19½ to 24½ minutes after dispersion —

239 million particles of Regular Seacoal per cu. ft. of air.

½ million particles of HYGEIA SEACOAL per cu. ft. of air."

(400 particles of Regular Seacoal to 1 particle of HYGEIA SEACOAL

"The counts of less than one million particles approach the range of normal room air and the small differences between counts below one million are not considered significant."

AIR USING HYGEIA SEACOAL

HYGEIA SEACOAL SOLD UNDER UNCONDITIONAL GUARANTEE TO CONFORM TO OUR CLAIMS

PENN-RILLTON COMPANY

324 West 23rd Street, New York 11, N. Y.

PLANTS:
Irwin and West Elizabeth, Pa.

Manufacturers of: "Facemols", Shake-On, Spray-On, Hygeia Seacoal, Hygeia Pitch, Blended Core Compounds

BAKER "FG" — a new concept in gas truck construction — "BALANCED DESIGN"

Here's how the Baker FG gas fork truck—"first in its class"—was conceived:

First: Exact requirements for a specific truck in the FG line were thoroughly analyzed. Then our engineers, working with a top manufacturer of heavy-duty industrial gas engines, chose the power plant specifically to meet these requirements. Even internal parts of the engine were balanced. For example, our specifications call for pistons balanced to ± 2 grams instead of the conventional ± 2 ounces.

Next: Transmission was selected to match the power plant and geared to provide required speeds and acceleration. In conjunction with the largest builder of axles in the country, the drive axle was developed to match power plant and transmission.

Lifting mechanism was selected to meet requirements and to be coordinated with power train and other components. *Mast* was engineered for the maximum safe lift, within the stability ratio of the frame which was designed for exceptionally low center of gravity. The standard Baker wide-angle steer, rubber mounted, trailing axle was modified to match the other elements.

Result: 100% Balanced Design —another Baker "First".

Baker "FG" gas fork trucks are available with 3,000, 4,000, 5,000 and 6,000 pound capacities. Specific bulletins can be obtained by writing The Baker-Raulang Company, 1223 West 80th Street, Cleveland 2, Ohio.

Baker
HANDLING EQUIPMENT

8 REASONS WHY THE BAKER FG FORK TRUCK IS FIRST IN ITS CLASS...

1. LOWER INITIAL COST
FG-40 (4000 lb.) $4295 Other models at proportionate savings.

2. LONGER WARRANTY PERIOD
Baker quality permits full 6 months' warranty.

3. HIGHER LIFT
Mast design allows higher standard lift than ordinary trucks.

4. LOWER MAINTENANCE COSTS
Designed for easier and less frequent servicing.

5. MORE MANEUVERABLE
Short turning radius cuts aisle width, adds floor space.

6. EASIER TO OPERATE
Greater visibility . . . easy-to-work controls.

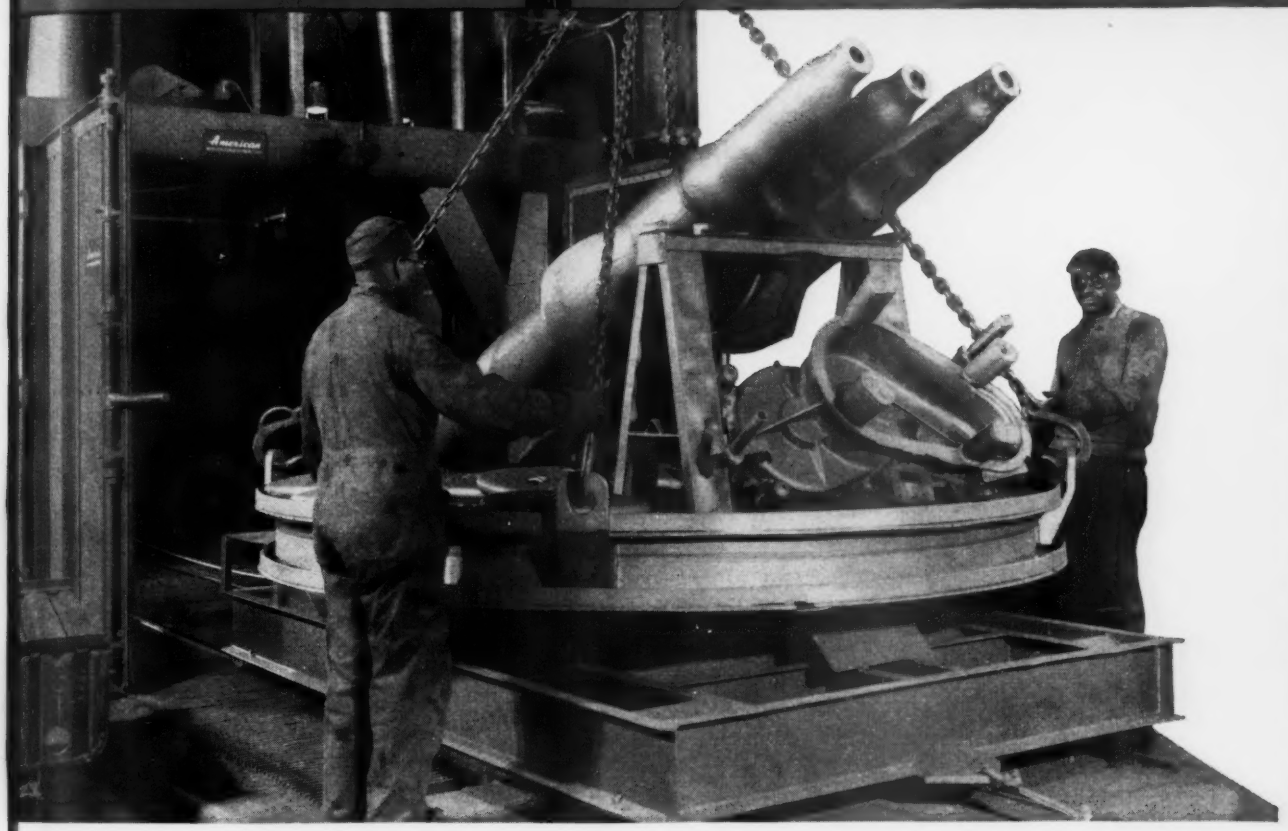
7. GREATER STABILITY
Lower center of gravity . . . higher "stability factor" ratio.

8. BETTER BRAKING
Full floating, self-equalizing, self-energizing brakes.

5G1

cleaning costs slashed 40%

Wheelabrator® blasts the props from under cleaning costs



A Wheelabrator Car-Type Room, replacing a large airblast room, has reduced cleaning costs 40% for a prominent Chicago steel foundry.* It slashed 28 man hours daily in direct cleaning room labor. Cleaning large steel castings weighing up to 8,000 pounds each in just 12 minutes, it reduced cleaning time to a mere fraction of the airblast time required. This airless Wheelabrator Room provides improved surface cleanliness to reduce grinding and chipping costs. Blast the props from under your cleaning costs. Use a high-production, versatile Wheelabrator Room. Write today for Bulletin 854 which describes machine designs and includes actual job-study reports. Take advantage of Wheelabrator engineers' long experience in designing machines for any requirement.

*Name on request

Use genuine Wheelabrator Long-Lyfe wear-resisting parts

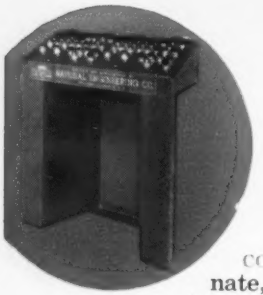
American WHEELABRATOR®

trail blazer of industrial progress

AMERICAN WHEELABRATOR & EQUIPMENT CORP., 505 S. Byrkit St., Mishawaka, Indiana

TIME IS MONEY . . . SAVE BOTH WITH . .

Photo above shows new, compact Mix-Muller installation at Forging & Casting Division, Allegheny Ludlum Steel Corp., Ferndale, Michigan. Unit includes No. 1½F (1000 lb.) Simpson Mix-Muller, National Bucket Loader and National Aerator. National TIME-MASTER controls entire operation in preparing facing, backing and core sand.

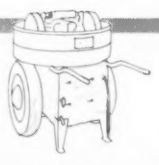


CONSOLE MODEL: An alternate, desk type control panel for the National Timemaster can be provided for convenient location anywhere in the foundry.

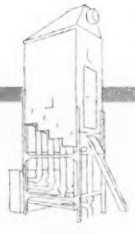
TYPICAL control panel arrangement for Timemaster operation of two No. 3F (4000 lb.) Mix-Mullers. Dials above inspection doors indicate moisture content of batch—through National "Moisture-Master."

PRODUCTS OF THE PRACTICAL FOUNDRYMAN

SIMPSON MIX-MULLERS
25 to 4000 lb. batch capacity

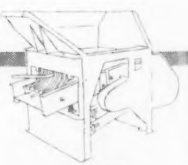


SIMPSON PORTO-MULLER
250 lb. capacity (100% portable)



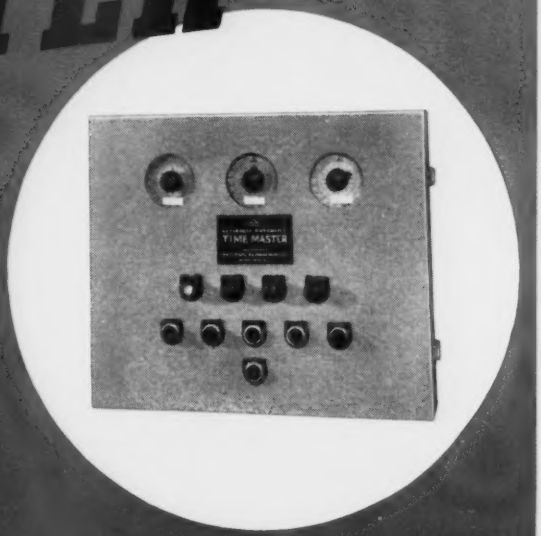
NATIONAL SAND RECOVERY SYSTEM
Practical pneumatic sand scrubber

NATIONAL HYDRO-FILTER
Wet type dust collector



NATIONAL SCREEN MASTER
Screening and magnetic separating unit.

NATIONAL TIMEMASTER®



Nobody "forgets" to add the bond or core oil with the new Mix-Muller installation at the Forging and Casting Division of Allegheny Ludlum Steel Corp. in Ferndale, Michigan. This compact, TIMEMASTER-operated No. 1½ Mix-Muller installation turns out high quality, uniformly mulled backing, facing and core sand fast, and *automatically* with welcome savings in core oil and binders.

Here's how it works:

ON FACING SAND: The number of quarts of water required is set on the panel of the Timemaster control unit. The total cycle is set for mulling and the knob is turned to automatic. When the start button is pushed all phases of mulling are automatic—indicating lights reveal the sequence of operation. After mulling the discharge door opens and mixer is discharged by plow action.

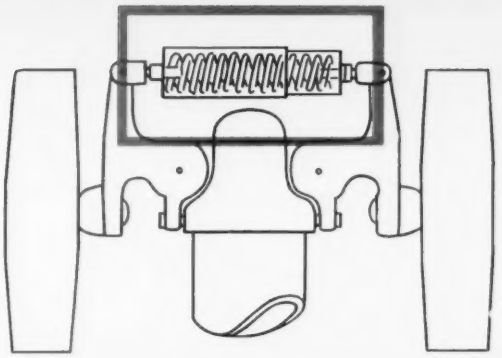
ON BACKING SAND: The backing sand operation is similar to the facing sand mulling sequence. Total cycle time may vary as well as may the moisture additions. The operator re-sets two knobs and the Timemaster again controls the phases of mixing. Quality and uniformity are greatly enhanced.

ON CORE SAND: Quarts of water are set on one dial, quarts of oil on another and total cycle adjusted on the third to automatically provide the proper mixing cycle for core sand mixing. Water and oil, accurately measured and automatically injected into the batch at the proper time, relieve the mixer operator of these tasks and insure maximum uniformity and quality.

AT THE TURN OF A SWITCH you can eliminate the "human element" from your mixing operations with the National Timemaster. Designed to increase production by effective coordination of all phases of the mixing cycle, the Timemaster can also make quality control a reality in your foundry and—automation an everyday tool—working for you. Write today, for details.

Spring loaded mullers mean more mulling per minute . . . per dollar invested.

NOW AVAILABLE on Simpson Mix-Muller models in a batch capacity range of from 50 to 4000 lbs., spring loaded mullers provide the ultimate in control over *every minute* of the sand mixing operation. With this unique innovation, it is possible to *pre-set* muller weights according to the type of sand to be mulled. Maximum muller pressure is exerted as the sand increases in strength during mulling — when pressure is *most* needed.



National Engineering Company
(Not Inc.)
646 Machinery Hall Bldg. • Chicago 6, Illinois

Busy Foundry Gets High Speed, Better Sand Control, Lower Maintenance with PEKAY AIRATORS

Surge loads of 300 tons per hour of thoroughly aerated, fluffed, lump-free sand—with the belt running at 311 ft. per minute—that's the kind of day in and day out production RIVERSIDE FOUNDRY of Bettendorf, Iowa, is getting on their No. 1 PEKAY AIRATOR unit. Units No. 2 and 3 on Riverside's two other systems are performing with similar efficiency.

And if you ask Joseph Avdek, Riverside's Plant Engineer, he'll tell you that the installation of these PEKAY AIRATORS was easy, and took amazingly few man-hours—with no major changes necessary in his belt systems. Another point Mr. Avdek likes, besides the steady efficiency with which his AIRATORS turn out properly aerated sand, is the ease of inspection of all moving parts through the AIRATOR sideplates, and the low maintenance which is already helping him to show lower operating costs.

In addition, Mr. Avdek knows from PEKAY's records of numerous other AIRATOR installations in various parts of the country that he can expect exceptionally long life and much less frequent replacement of wearing parts with this compact but ruggedly built equipment. Any way *you* look at it, the AIRATOR can help you get rid of a lot of your sand-conditioning problems—and you'll be pleasantly surprised at how low your outlay will be!

You'll find PEKAY's better engineered, high-efficiency equipment in plants large and small all over the country—*Slurry Systems, Mixer-Mullers, Troff-O-Matic Conveyors, M-T-Matic Elevator Buckets,* as well as AIRATORS.

SEND FOR COMPLETE DETAILS TODAY!

Specialists in Foundry Sand-Handling Engineering & Equipment

PEKAY MACHINE & ENGINEERING CO.

871 N. SANGAMON STREET CHICAGO 22, ILLINOIS

M-T-MATIC Elevator Conveyor Buckets
TROFF-O-MATIC Conveyors

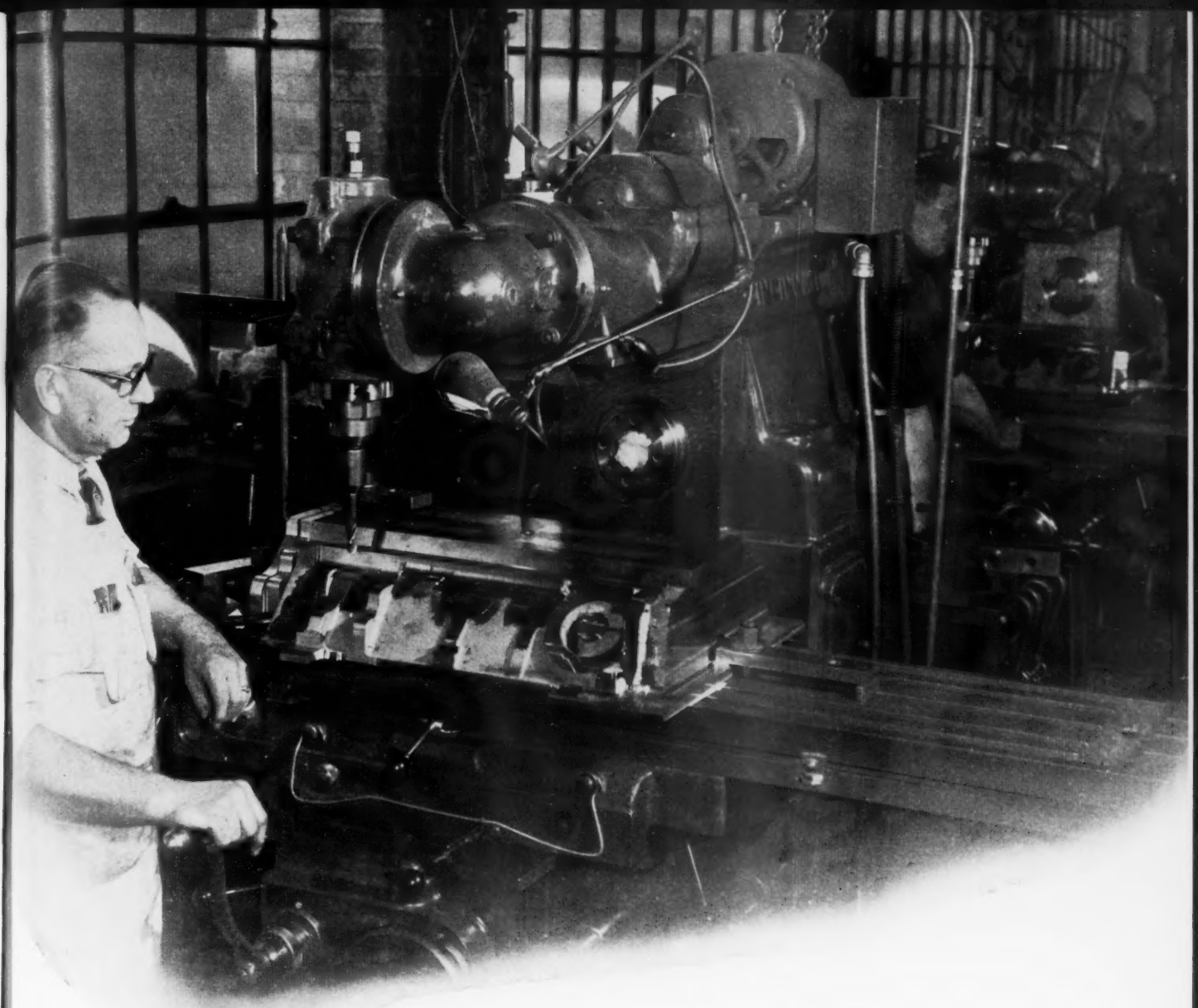
Gentlemen:

Please send me details and price information on the PEKAY AIRATOR

NAME _____ TITLE _____

COMPANY _____

STREET & NO. _____ CITY _____ ZONE _____ STATE _____



Adam Pyle had this in mind fifty years ago

"Hire only the *best* men", Adam Pyle insisted, "and buy only the best machines. *That's* how to do the finest work – for the finest customers!"

That was 'way back in 1905 when the Pyle Pattern & Manufacturing Company name was still drying on the door. Now – half a century later – we can still prove he was right!

You'll find our plant teeming with men of unsurpassed skills . . . turning out consistently superior work on the best machines money can buy. And our customer list reads like the Blue Book of American industry – great firms grown to greatness through uncompromising quality of product.

May we serve you, too?

PYLE

PATTERN AND MANUFACTURING COMPANY

MUSKEGON HEIGHTS, MICHIGAN

1905 Our Fiftieth Anniversary 1955

Time proven

NARCO

refractories

NARCOLINE

Slag-resistant plastic refractory

FOR CUPOLA SPOUTS, LADLES, RUNNERS, ETC.

Products for use where temperatures are high and severe—particularly for the metallurgical industry.

NORTH AMERICAN REFRACTORIES COMPANY

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PITTS. 22—1938 Oliver Bldg.
CHICAGO 5—59 E. Van Buren St.
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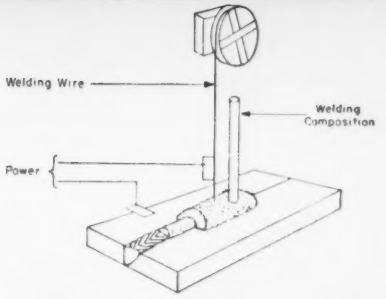
DETROIT 2—420 Curtis Bldg.

NORTH AMERICAN REFRACTORIES LTD. 191 Victoria Ave., So. HAMILTON, ONTARIO

UNIONMELT Welding Solves "Impossible" Casting Job . . .



UNIONMELT welding solved the problem when a manufacturer was unable to make one-piece castings of compressor cylinders used in gas line pumping stations—other welding methods proved too slow and costly . . . UNIONMELT welding cuts 40 hours in production time, and produces high-quality welds that easily withstand pressure of 750 lb. per sq. inch.

The 42-in. diameter cylinder is cast in two halves, and has an internal piston bore with surrounding suction and exhaust chambers . . . The 2½-in. thick piston walls and 3-in. thick outer walls of each half are aligned and UNIONMELT welded.

Like many other products throughout industry, these cylinders are being fabricated faster and more economically than ever before, because UNIONMELT welding offers:

- Higher welding currents than other welding processes . . . Up to 4,000 amperes . . . Joins metal of any thickness.
- Greater economy—½ to ⅔ less welding wire . . . Also uses larger-diameter, less-expensive wire.
- Use of any power supply—a.c., d.c., or constant potential . . . With c.p., no control is necessary to maintain constant arc voltage—welding is fast and more easily controlled.

Start saving now—call your local LINDE representative for more information and ask for Form 7912, "Modern Methods of Joining Metals."

Linde Air Products Company

A Division of Union Carbide and Carbon Corporation

30 East 42nd Street UCC New York 17, N. Y.

Offices in Other Principal Cities

In Canada: LINDE AIR PRODUCTS COMPANY

Division of Union Carbide Canada Limited, Toronto

(formerly Dominion Oxygen Company)

The terms "Linde" and "Unionmelt" are registered trade-marks of Union Carbide and Carbon Corporation.

Linde Trade-Mark

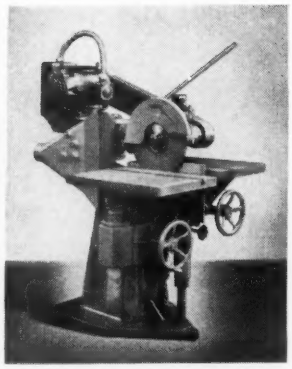
It's the low-cost producer who sets the price

EITHER you match it, or you just don't compete successfully in the foundry business.

The low-cost producer is that happy plant which has answered the question facing most foundries today—"Just *how* do I produce a *better* casting *faster* and at *lower* unit cost?"

- It's easy. A low-cost investment in proved Tabor time-and-labor-saving machines—on a *job-plan* basis—is often the way *you* can set the price, get the order.
- Actually, these machines start to make money for you *the moment you decide to buy one.*

Talk to a Tabor engineer today, or write for a catalog. You'll find it remarkably easy to learn why business has a way of going to the low-cost producer . . . who sets the price.

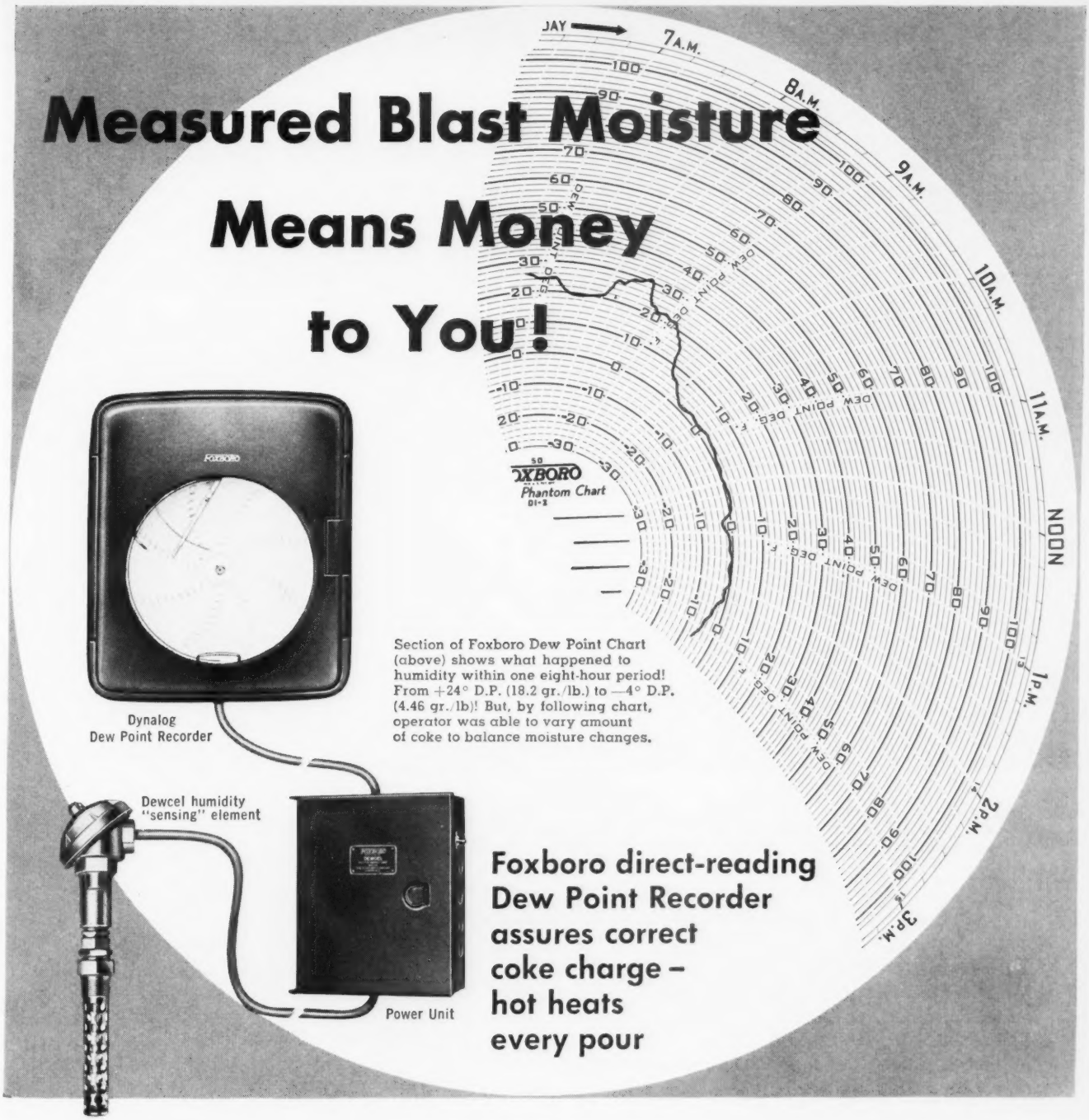


Tabor-Brasive Cut-Off Machine
Type C10AF, 10 hp. One of many sizes from 5 up to 20 hp. Split table design, with movable head capable of handling work height up to 46". This unit drops cutting time as much as 90% over sawing or chipping. It saves metal, reduces snagging, gives excellent cut surfaces. And it's backed by over 70 years of Tabor foundry experience.

Flask Lift Machines • Squeezers and Jar Squeezers
Jarring Machines • Rollover Machines
Abrasive Cut-Off Machines • Vibrators

The TABOR TRADE 1884 MARK Manufacturing Co.
Division of
TURBO MACHINE COMPANY
LANSDALE, PA.

Measured Blast Moisture Means Money to You!



Section of Foxboro Dew Point Chart (above) shows what happened to humidity within one eight-hour period! From +24° D.P. (18.2 gr./lb.) to —4° D.P. (4.46 gr./lb)! But, by following chart, operator was able to vary amount of coke to balance moisture changes.

Foxboro direct-reading Dew Point Recorder assures correct coke charge – hot heats every pour

You can accurately compensate for the widest **variations** in blast moisture . . . pour consistently **hot heats** every day using the Foxboro Dew Point Recorder. Its *continuous* chart record of atmospheric moisture provides a foolproof basis for modifying the coke charge . . . eliminates coke waste and costly "cold metal" pours.

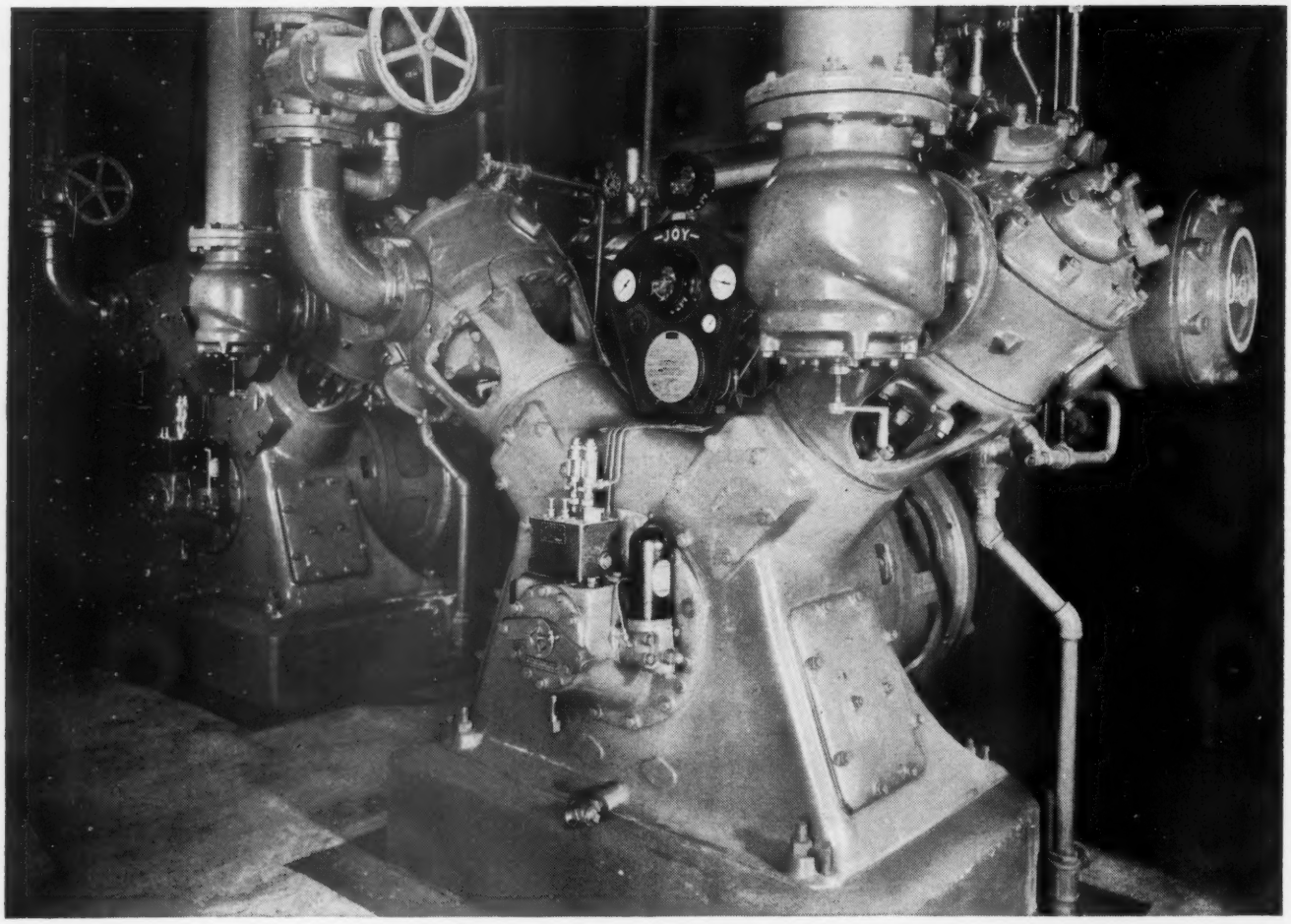
And you don't have to "baby" *this* Recorder. Accuracy is unaffected by ambient temperature changes. No critical adjustments . . . practically no maintenance! Step up efficiency *and* economy in *your* cupola operation. Write, or ask your nearby Foxboro Field Engineer for Data Sheet 330-1 on recording, and control, of blast moisture.

THE FOXBORO COMPANY, 327 NEPONSET AVENUE, FOXBORO, MASS., U. S. A.

FOXBORO
REG. U. S. PAT. OFF.

DEW POINT RECORDERS

FACTORIES IN THE UNITED STATES, CANADA, AND ENGLAND



The Case of the "GOOD AS NEW" COMPRESSORS

These two Joy WN-112 air compressors were used for several years in really heavy-duty operation under extremely tough conditions.

They were installed at different times . . . the newest about four years ago. Plant personnel report that, with nothing more than customary plant maintenance, they are still "good as new" and still furnishing, without shutdowns, the air to keep the plant in operation.

Durability and easy maintenance are built-in features of Joy WN-112 compressors. Cylinder and crosshead liners are field-replaceable, and made of alloy iron, honed to a mirror finish. Large area, low lift Joy "Dual Cushion" valves are set at the most efficient angle in both heads. Lubrication is by force-feed to all moving parts with automatic shut-off protection.

The Joy WN-112 is a heavy-duty, continuous service, two-stage, double-acting compressor of V-vertical design. It is normally powered by a flange-mounted motor but is adaptable to diesel, steam turbine, flexible coupling, V-belt or flat belt drive. It is a versatile machine and a compact space-saver in any plant.

For complete details on the Joy WN-112, write for Bulletin A-62 to ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario*

Consult a Joy Engineer

for VANEAXIAL FANS • COMPRESSORS • VACUUM PUMPS AND BOOSTERS • OXYGEN GENERATORS

JOY

SPECIALISTS IN THE COMPRESSION AND MOVEMENT OF AIR AND GASES SINCE 1885

Ready to *BLAST!*

Reduce Nozzle Changing with Long-Life NORBIDE® Nozzles

These rugged nozzles — lined with NORBIDE Boron Carbide, the hardest manufactured material commercially available — maintain stream contour and last hundreds of hours longer than any other Nozzle made, eliminating expensive nozzle changing.

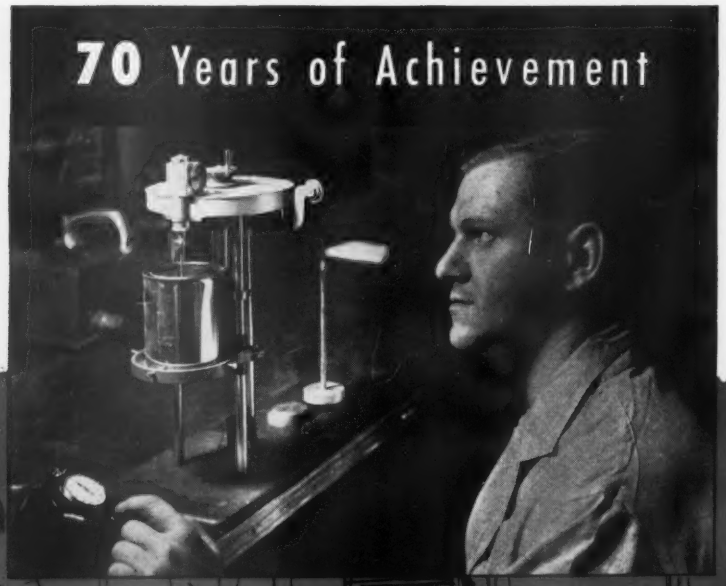
Available in a variety of sizes and styles. Try 'em on your toughest blasting jobs. For full details, write for your free copy of Form 543.

NORTON COMPANY
43 New Bond Street, Worcester 6, Mass.

NORTON
BORON CARBIDE

NORBIDE®... *The Longest Nozzle Life You Can Buy*

70 Years of Achievement



Gone are the days when grandpa tested paint with two vials and an air bubble in each.

Today, split second accuracy in testing the viscosity of paints is a routine job in TOUSEY's product development laboratory. Here carefully trained personnel use the latest testing equipment and instruments to assure TOUSEY customers of the finest in paints, lacquers, varnishes and sealers. Seventy years of steady growth and achievement are celebrated this year at TOUSEY.

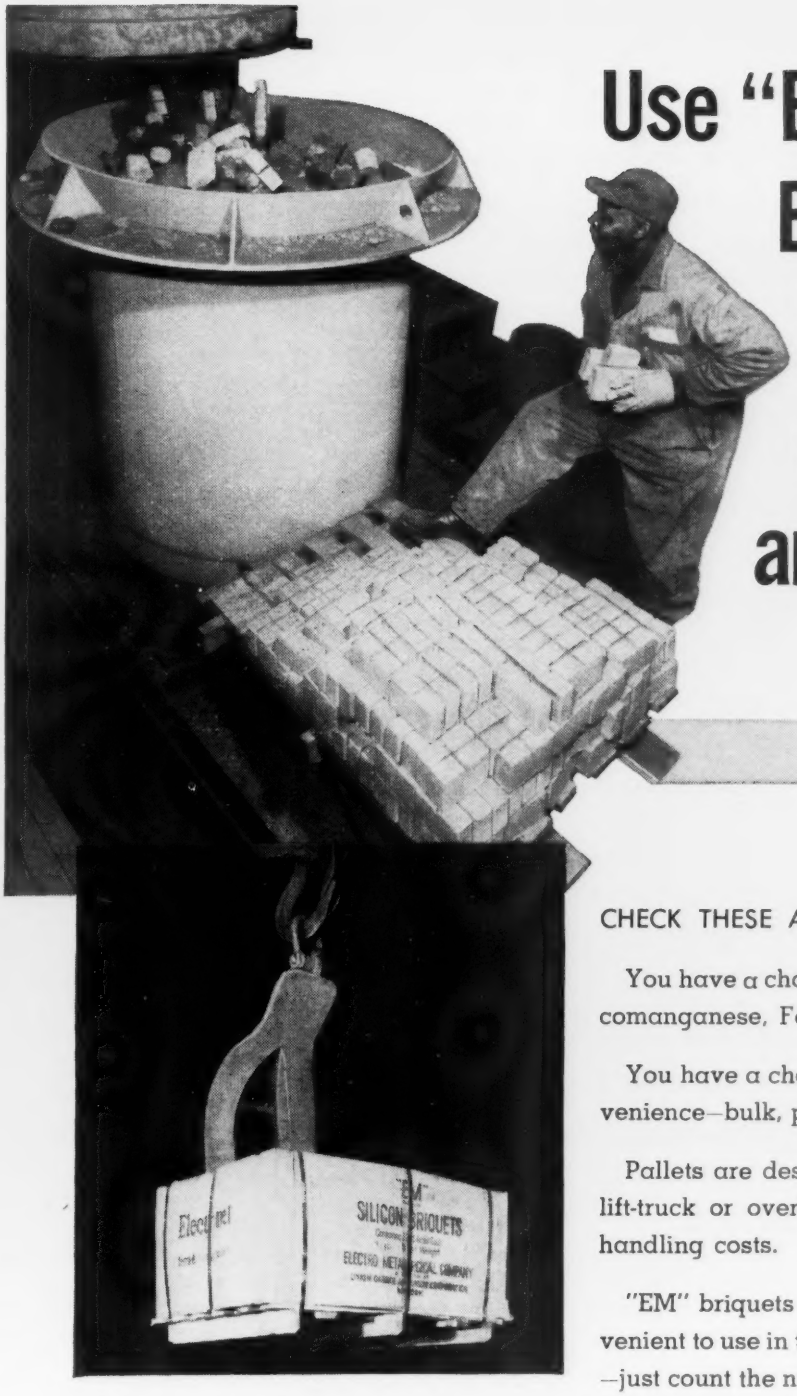
Let us help you with your finishing problems—write today.

TOUSEY PRODUCTS

DURACOTE for DURABILITY

TOUSEY VARNISH COMPANY

520 WEST 25TH STREET • CHICAGO 16, ILLINOIS



Use "EM" Ferro-Alloy Briquets for convenient charge make-up and easy handling

For additional information write or phone the ELECTROMET *office nearest you.*

CHECK THESE ADVANTAGES

You have a choice of 5 kinds of "EM" briquets—Silicon, Silicomanganese, Ferromanganese, Chromium, and Zirconium.

You have a choice of 3 kinds of shipments to suit your convenience—bulk, packed on pallets, or packed in 250-lb. bags.

Pallets are designed for fast, easy, and safe handling by lift-truck or overhead crane. Pallet shipments reduce your handling costs.

"EM" briquets are easy to handle in the foundry and convenient to use in the cupola charge. No weighing is necessary—just count the number of briquets to obtain the weight needed for the charge.

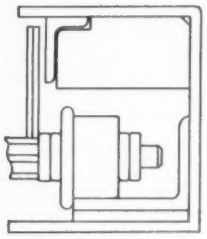
"EM" briquets are scientifically designed for maximum alloy recovery in cupola melting.

The terms "EM" and "Electromet" are trade-marks of Union Carbide and Carbon Corporation.

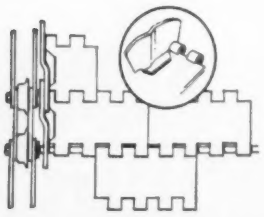
ELECTRO METALLURGICAL COMPANY
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
OFFICES: Birmingham • Chicago • Cleveland • Detroit
Houston • Los Angeles • New York • Pittsburgh • San Francisco
In Canada: Electro Metallurgical Company, Division of Union Carbide Canada Limited, Welland, Ontario

Electromet
TRADE-MARK
Ferro-Alloys and Metals

May-Fran hinged-steel conveyor belts



Construction details of "skirt" which prevents entry of foreign matter and protects side chains.



Outside links incorporate interlocking wings . . . remain positively engaged at all times.

For more efficient, more economical production in your plant . . . mechanize the handling of die castings. MAY-FRAN Hinged-Steel Belting keeps castings on the move . . . continually . . . automatically. Saves handling equipment, saves aisle space, saves manpower.

MAY-FRAN Hinged Steel Conveyor Belting withstands hot, heavy or abrasive parts . . . is built for long life and maintenance-free operation. Precision formed, heavy-gauge hinged-steel links are connected in horizontal rows by means of high-carbon steel rods. Side chains are an integral part of the belt . . . interlocking wings remain positively engaged, even when traveling over sprockets.

MAY-FRAN Hinged-Steel Belting can be furnished in widths from 6 inches to 6 feet . . . in any length . . . in any carrying capacity . . . with solid or perforated links in 2½ to 12-inch lengths.

For complete information, write today for Bulletin MF-530.

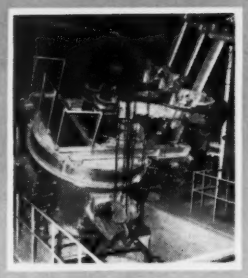
DESIGNERS AND BUILDERS OF COMPLETE HANDLING SYSTEMS

2058-MF

MAY-FRAN ENGINEERING, INCORPORATED

1692 Clarkstone Road • Cleveland 12, Ohio

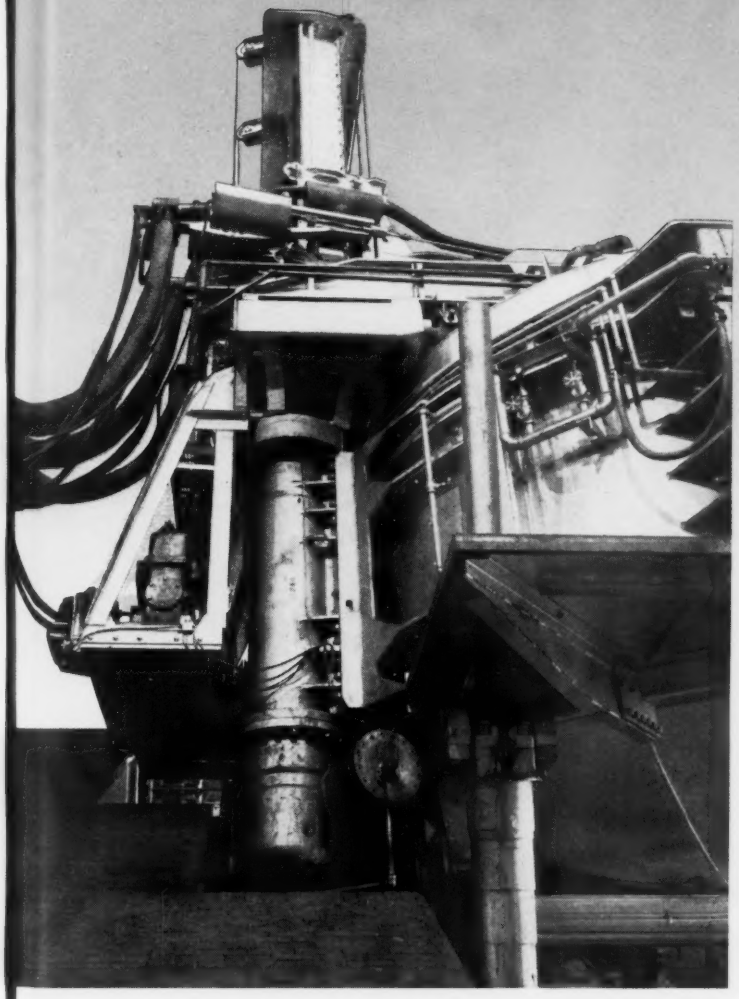
• ONE OF A SERIES OF MESSAGES TO MODERN FOUNDRY MANAGEMENT



SWINDELL

SINCE 1850

FOUNDRY ELECTRIC MELTING FURNACES



RUGGED OVER-SIZED ROOF CYLINDER

–Another SWINDELL Quality Feature for Fine Furnace Performance

OUTSTANDINGLY SUPERIOR in design, construction and operation, the SWINDELL hydraulic roof lift and swing cylinder is a major operating feature. Perfect alignment, always, is assured by attachment to furnace shell. Permanent engagement with roof superstructure guarantees proper sequence. No manual clamps or kingposts, no special foundations or pits for piping—instead, a single massive unit integral with the furnace, powerful, dependable, smooth in operation year after year. You can depend upon SWINDELL experience. Let it serve you in the foundry field.

SWINDELL Electric Melting Furnaces for foundry service provide the productivity, low maintenance and long, useful life built-in by genuine steel mill design and construction by steel mill melting furnace specialists. Write for a consultation.

WRITE for your copy of the latest Swindell Electric Melting Furnace Catalog — sent promptly on request.

SWINDELL-DRESSLER
CORPORATION
Designers and Builders of Modern Industrial Furnaces
PITTSBURGH 30, PA.

pleasantly!

HINES POP-OFF FLASK
FEMA

the HINES flask co.

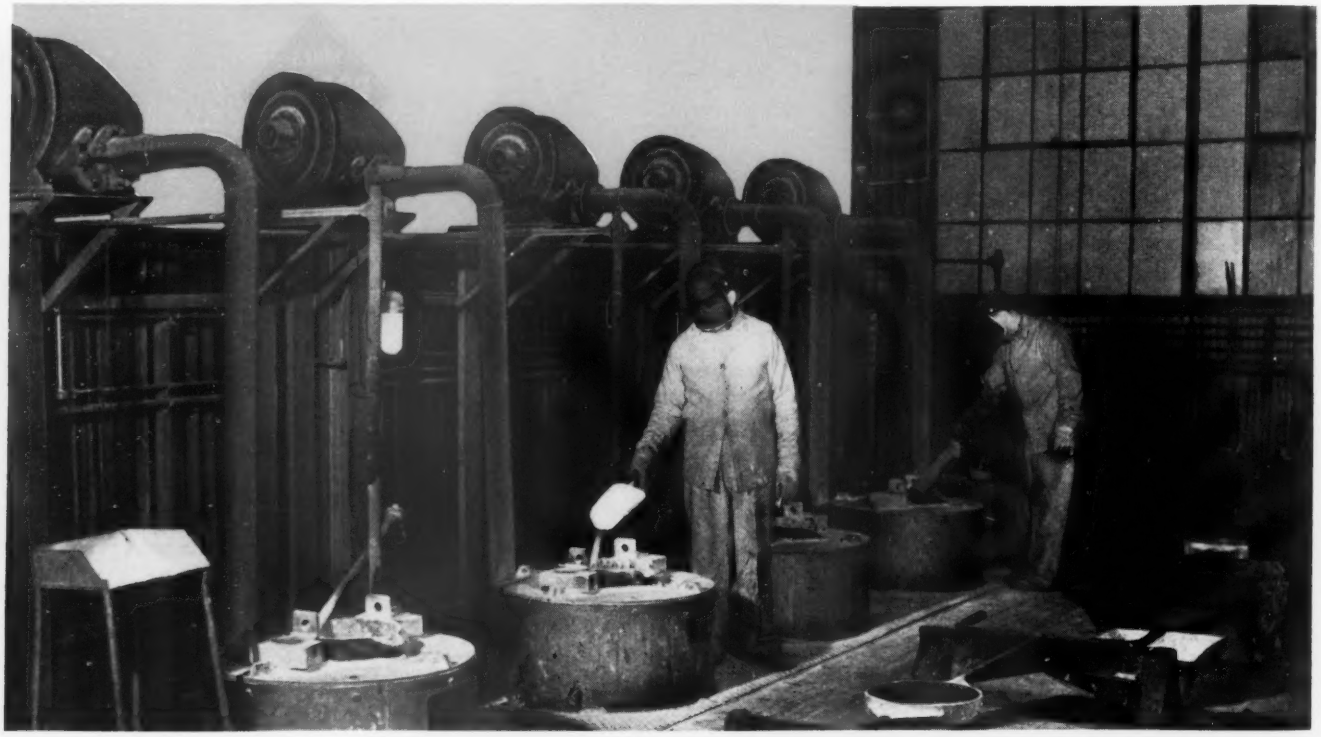
3431 WEST 140TH STREET • CLEVELAND 11, OHIO • PHONE ORCHARD 1-2806

Nonferrous Melting with . . .

SPENCER
HARTFORD

TURBO-COMPRESSORS

There are many methods of melting non-ferrous metals but the accepted standard for furnishing air to Oil and Gas fired furnaces is the Spencer Turbo-Compressor. A battery of Spencer 5 HP turbos in the foundry of a large Chemical plant is shown below.



For complete description of the standard and special Turbos ask for Bulletin No. 126-A.

Thirty-five years ago the Spencer Turbo was first specified by a furnace manufacturer. Today it is the first choice of all of the leading furnace and oven manufacturers.

The reasons they prefer Spencer are the absolute reliability—perfect performance and low maintenance over long years of almost continuous service. Spencer Turbos range in size from 35 to 20,000 cu. ft. per min., 4 oz. to 10 lbs. and 1/3 to 1,000 HP.

THE SPENCER TURBINE COMPANY

SPENCER
HARTFORD

HARTFORD 6
CONNECTICUT

494-N

Manufacturers of Turbo-Compressors and Heavy Duty Vacuum Cleaners

FOSECO®

world-wide service eliminates foundry problems

For over twenty-four years FOSECO products and services have been helping foundrymen solve and eliminate foundry problems. Many specialized products have been developed by FOSECO laboratories, all of which have played a major part in the growth and advancement of the foundry trade. Wherever metals are melted and cast, in foundries and refineries all over the world, FOSECO products are available. There is a FOSECO product for every foundry need and for every type of metal.

here are a few typical FOSECO *products:*

- **FOR ALUMINUM ALLOYS —**

  Coverals — Covering and protecting fluxes for aluminum alloys.

  Degasers and Nucleants — For removal of harmful gases from aluminum melts and for refining grain size of the metal. Grades giving separate degassing, grain refining or a combined action are available.

- **FOR COPPER BASE ALLOYS —**

  Cuprits — Covering and protecting fluxes for use on copper and yellow brasses.

  Cuprex — Covering, cleansing and degassing compounds for red brasses and nickel alloys.

  Albrals — For removing oxide and other inclusions from high tensile brasses.

  Regenerators — For cleaning and degassing copper and nickel alloys.

  Deoxidizing Tubes — For deoxidizing and increasing the fluidity of copper and nickel alloys.

- **EXOTHERMIC FEEDING COMPOUNDS FOR ALL METALS —**

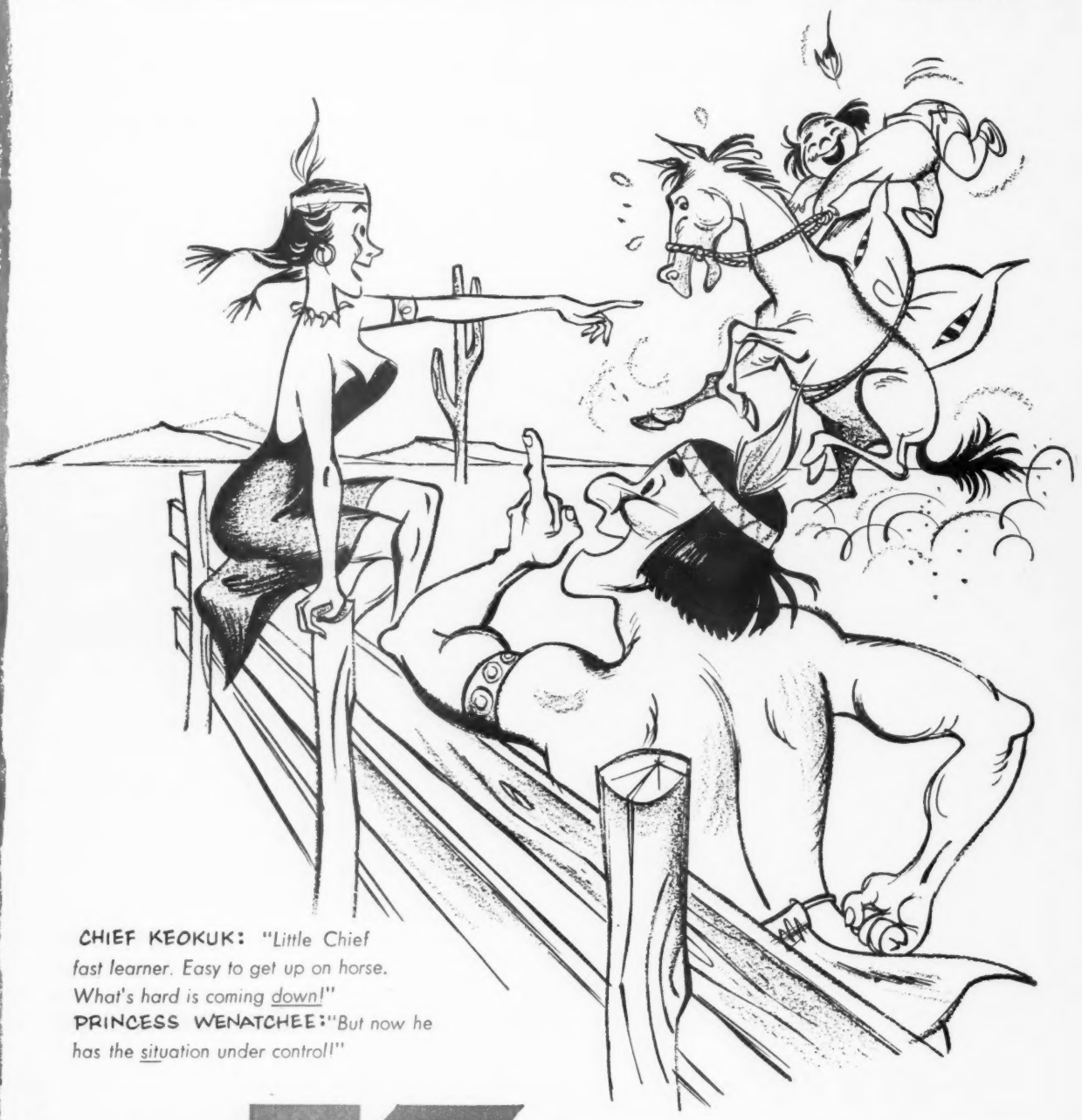
  Feedex — A range of moldable exothermic compounds (covered by U. S. Patent No. 2,591,105) which greatly reduce the riser volume, and increase casting yield. Also helps correct unfavorable temperature gradients and insures progressive solidification of the casting or ingot. Grades are available for all metals and alloys.

  Ferrux and Feedol — A complete range of riser covering compounds for ferrous and non-ferrous alloys. Both insulating and exothermic, these compounds give increased efficiency to conventional type risers and permit some reduction in riser height.

FOSECO® There are over 150 FOSECO products, covering every phase of foundry work, available in nearly every country in the world. FOSECO Technical Representatives cover almost forty countries, ready to give expert advice and assistance in foundry practice. Complete manufacturing plants are located in the United States, Canada, England, France, Germany, Italy, Austria, and South Africa. The American plant is now at a new, more central location in Columbus, Ohio, and representatives serving the entire nation are always available to help you solve your foundry problems. The Canadian plant is located in Guelph, Ontario.

FOUNDRY SERVICES, INC.
2000 Bruck Street, Columbus 7, Ohio

SITUATION UNDER CONTROL BY KEOKUK



CHIEF KEOKUK: *"Little Chief fast learner. Easy to get up on horse. What's hard is coming down!"*
PRINCESS WENATCHEE: *"But now he has the situation under control!"*

KEOKUK ELECTRO-METALS COMPANY.

KEOKUK, IOWA
WENATCHEE DIVISION, WENATCHEE, WASHINGTON

Keokuk Silvery . . . the *superior* form of silicon introduction for steel plants and foundries . . . available in 60 and 30 lb. pigs and 12½ lb. piglets . . . in regular or alloy analysis. Keokuk also manufactures high silicon metal.

Control both quality and costs with Keokuk Silvery Pig Iron! *Being a less concentrated form of silicon, Keokuk holds silicon loss to a minimum.*
Car for car, pig for pig, its uniformity *never* varies.
Charge *Keokuk* by magnet or count!

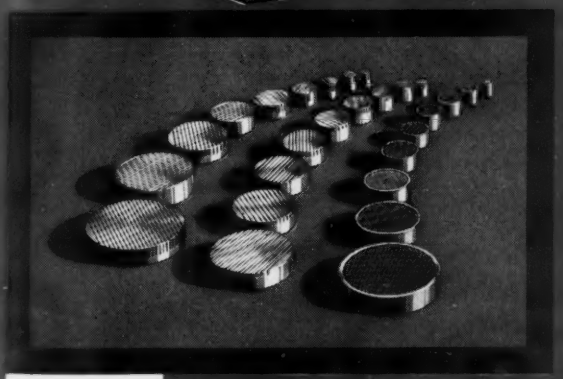
SALES AGENT: MILLER AND COMPANY
332 S. Michigan Ave., Chicago 4, Illinois
3504 Carew Tower, Cincinnati 2, Ohio
8230 Forsyth Blvd., St. Louis 24, Missouri

VERSATILE PRODUCTION BOOSTER

2 different CORE BOXES at once

DEMMLER MODEL 3T TWIN MAGAZINE CORE BLOWER

with automatic core box shuttle device and Demmler No. 7 Double Roll-Over Draw Machine.



HL 150 MESH

Demmler Core Box Vents

It makes good sense to buy core box vents from the company that pioneered the manufacture of core blowers. Demmler engineers are constantly improving vent design and developing new types. For example, the new HL 150 mesh vent is a special design for various applications including D-Process shell molding.

WRITE FOR LITERATURE

This machine handles two different core boxes, blowing each core box separately. It has two magazines and two automatic vibratory sand feeders which permit the running of two different types of sand mixtures at the same time! The fully automatic, one-man operation gives production rates up to 300 cores per hour. The 3T is a fast and versatile example of Demmler engineering!

There are three well known reasons for consulting Demmler about core blowers. 1. Demmler has over 45 years' experience building core blowers, 2. Demmler machines lead in high production, and 3. Demmler construction and design has proved it offers lowest maintenance. Call in a Demmler engineer next time you have a core blower problem.

Wm. Demmler & Bros.

KEWANEE, ILLINOIS

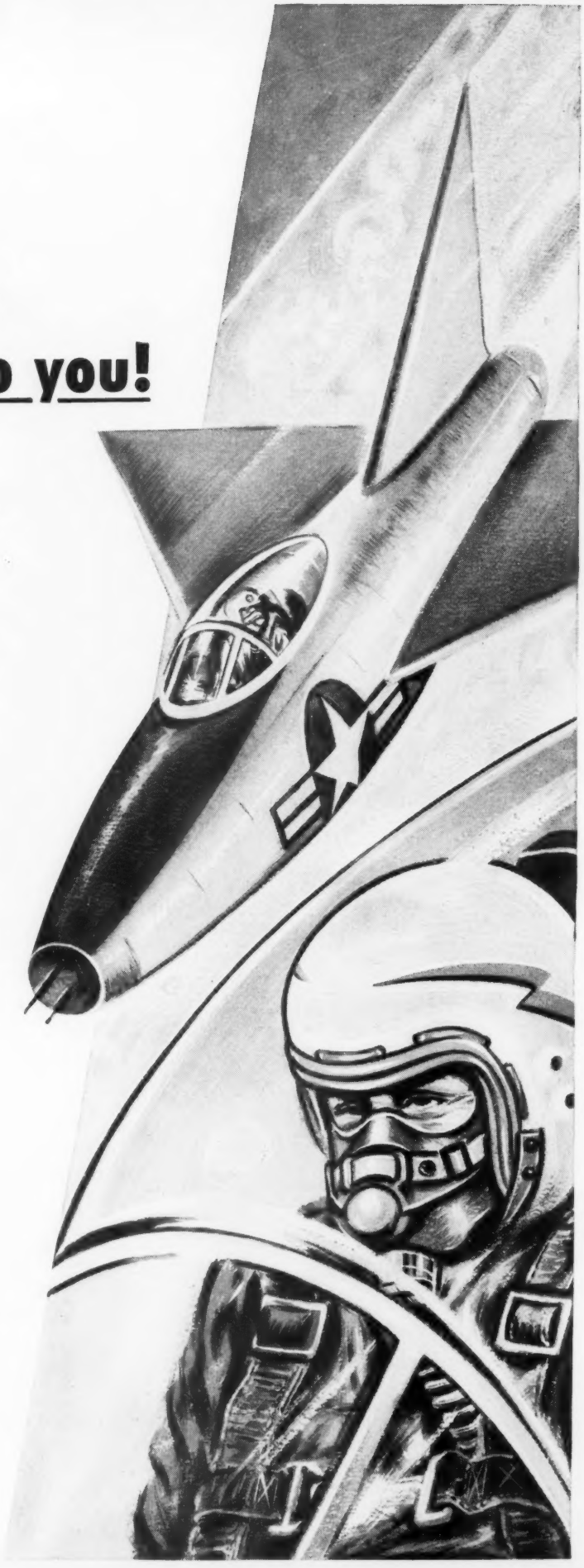
AIR

can be just as important to you!

The higher a jet flies . . . the thinner the atmosphere and the more important the pilot's air supply. If his air supply runs out . . . he "blacks out"!

Perhaps your plant's air supply . . . prime mover in dust and fume collection . . . is getting dangerously "thin". Rearrangement or addition of equipment, "temporary" piping or other factors may have slashed the efficiency of your collecting systems. Dust and fumes "out of control" run up costs, may affect employee morale and plant-community relations.

If you need new systems or more capacity in existing systems, consult Kirk & Blum, experts with 48 years of experience in the application of "clean air . . . the invisible tool". This organization of engineers and mechanics assumes complete responsibility for design, fabrication and erection. For complete information write: The Kirk & Blum Mfg. Co., 3239 Forrer St., Cincinnati 9, Ohio.

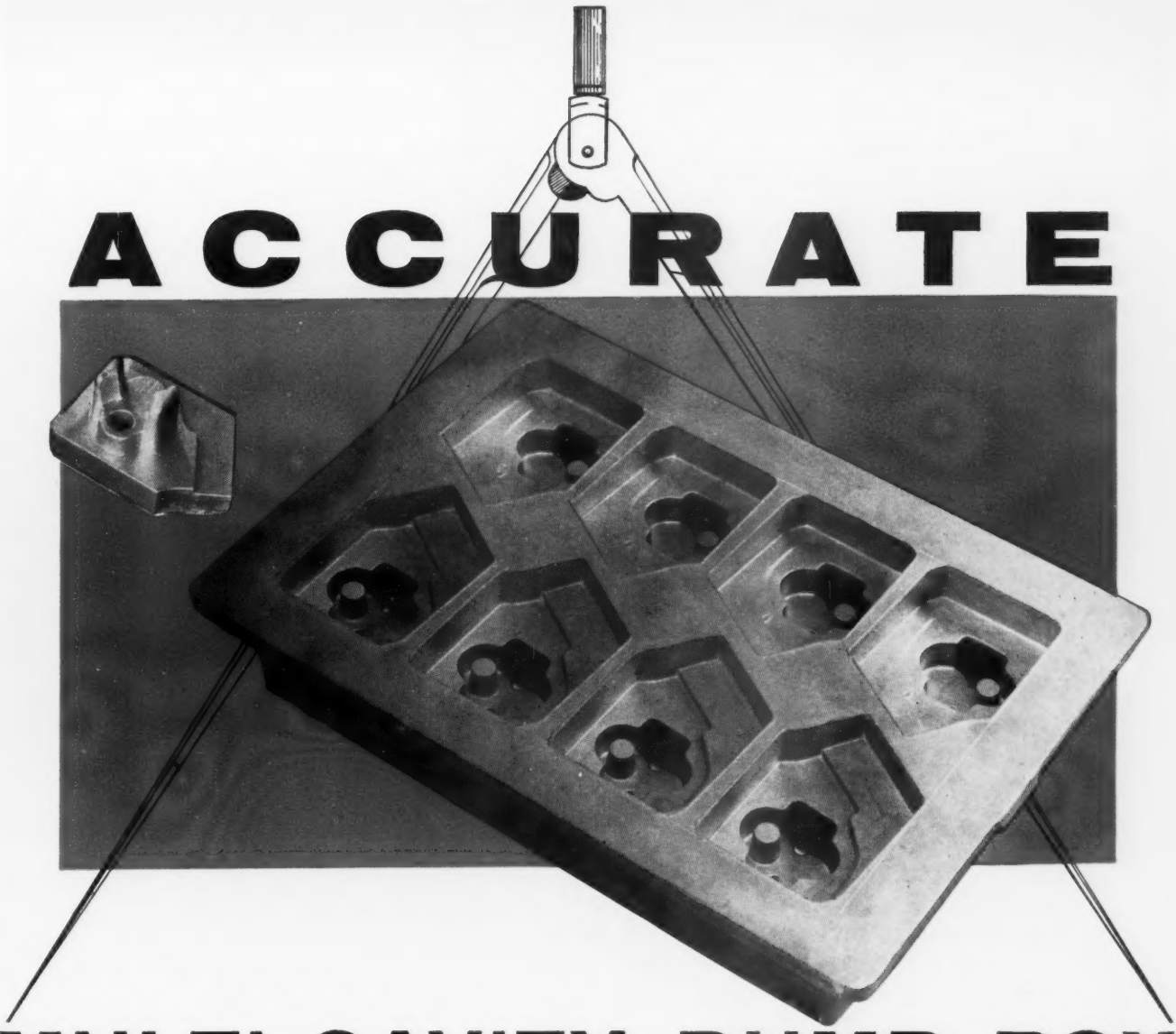


FOR CLEAN AIR . . . THE INVISIBLE TOOL

KIRK AND BLUM

DUST AND FUME CONTROL

ACCURATE



MULTI-CAVITY DUMP BOX

UNIFORM IMPRESSIONS... LOWER COST

The 8 gang dump box shown in this unretouched photograph was made from the single wood master core plug and backing frame. The same method may be used for two part split or booked type core boxes with flat or irregular partings. Added savings plus greater accuracy are assured when properly cleared white metal or aluminum master dryer patterns are also made by this same process.

There is real profit in this idea for you. Hundreds of foundries are now using this modern streamlined method of making core boxes and master dryer patterns because it is accurate, saves machining and offers large savings in the more intricate and gang type core boxes.

QUICK DELIVERY

By Air Freight, Parcel Post, Special Delivery or Railway Express. Pick-up and delivery by jobber representatives in the following areas . . .

AUBURN, MASS.
Henry A. Kottmann
Telephone: Auburn 2683

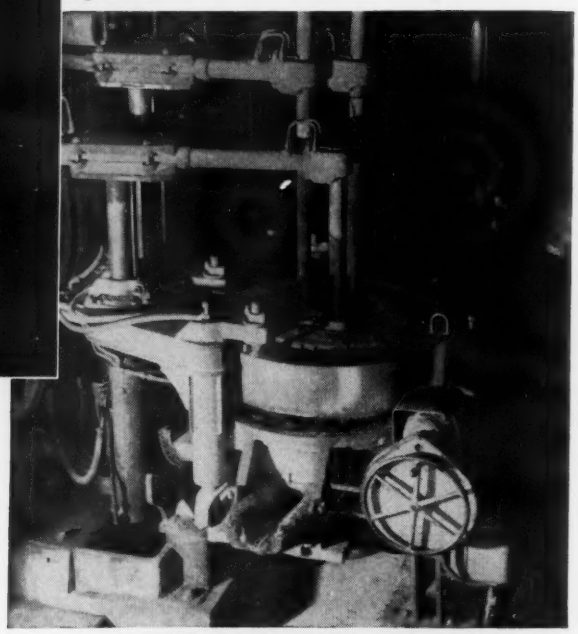
MILWAUKEE, WIS.
John M. Donohue
Telephone: Hilltop 2-7130

LOS ANGELES, CALIF.
McGowan Company, Inc.
Telephone: Trinity 2057

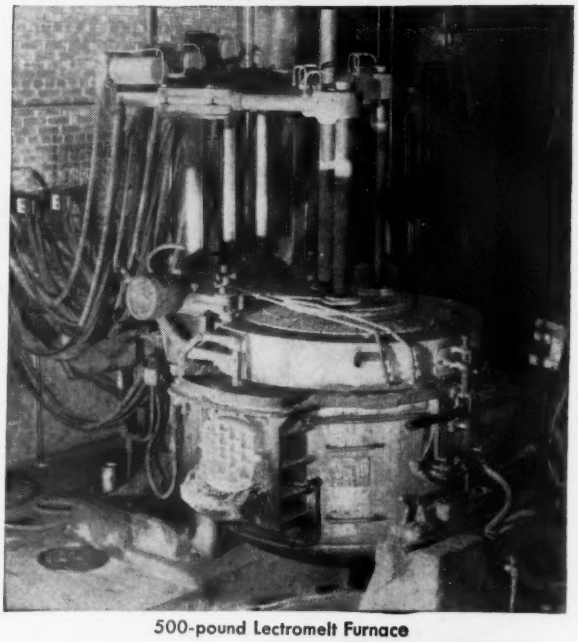
Write for Catalog

ACCURATE MATCH PLATE COMPANY
1849 WEST CARROLL AVENUE • Telephone: SEeley 3-7918 • CHICAGO 12, ILLINOIS

3,000-pound Lectromelt Furnace



1,000-pound Lectromelt Furnace



500-pound Lectromelt Furnace

We like the FLEXIBILITY provided by our 3 Lectromelt furnaces

SAY ELECTRO-ALLOYS DIVISION, AMERICAN BRAKE SHOE COMPANY, ELYRIA, OHIO

Electro-Alloys can make quick shifts in alloys melted and weight of metal cast, thanks to the flexibility offered by these three Lectromelt* Furnaces. By keeping the small furnace on Ni-Resist exclusively, they avoid the need for wash heats and assure integrity of the alloy.

They cast a great many different alloys, and the castings range in weight all the way from a few ounces to 13,000 lbs., calling upon the additional capacity of other furnaces.

Precise control of melting conditions is inherent in Lectromelt equipment. Whether you're working with iron, plain carbon or alloy steels, a Lectromelt Furnace will give you this advantage.

Lectromelt engineers will answer your questions and supply you with catalog data on Lectromelt Furnaces—25 lbs. to 150 tons. For Catalog No. 9, write Pittsburgh Lectromelt Furnace Corporation, 314 32nd Street, Pittsburgh 30, Pa.

Manufactured in... GERMANY: Friedrich Kocks GMBH, Dusseldorf... ENGLAND: Birlec, Ltd., Birmingham ... FRANCE: Stein et Roubaix, Paris... BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege ... SPAIN: General Electrica Espanola, Bilbao ... ITALY: Forni Stein, Genoa. JAPAN: Daido Steel Co., Ltd., Nagoya

*REG. T. M. U. S. PAT. OFF.

MOORE RAPID

WHEN YOU MELT... *Lectromelt*

Redford CORE BLOWERS

BENCH TYPE

MODEL NO. 2

MODEL NO. 4
(Also available with draw cylinder)

Proven performance — simplicity — flexibility — power — speed.

For 10 years now Redford has kept pace with progress in the foundry. From the first bench type to the new No. 4 . . . all Redford Core Blowers are designed to meet your demand for better cores at lower cost, regardless of production requirements.

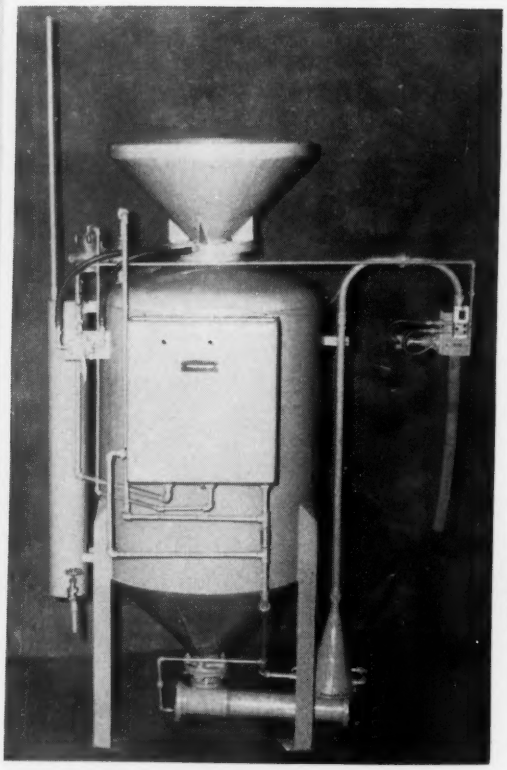
For complete information, write for our detailed literature.

Redford IRON & EQUIPMENT CO.

20733 GLENDALE AVENUE • DETROIT 23, MICHIGAN • PHONE: KENWOOD 1-8611

Another First!

HARTLEY BOND FEEDER



A NEW and REVOLUTIONARY DEVELOPMENT FOR SAND SYSTEMS . . . . NOT ONLY TRANSPORTS . . . . IT MEASURES DRY MATERIAL!

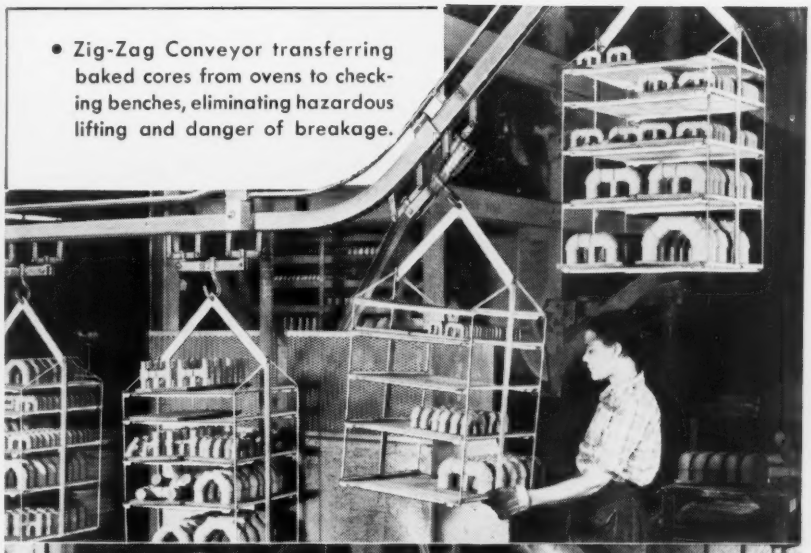
- A storage hopper large enough to store a days supply of any dry material is located conveniently at ground level.
- The material is transported to the mixer where it is accurately measured in individual batches as required.
- Batches of delivered material can be varied by a simple setting of the control.
- Available also for multiple mixing units operating from the same storage hopper. The quantity delivered to each mixer is accurately measured independently of other units.
- Low initial cost—Saves space—Dependable—Rugged—Flexible —*Accurate*

HAYLCO CONTROLS Corporation Neenah, Wisconsin

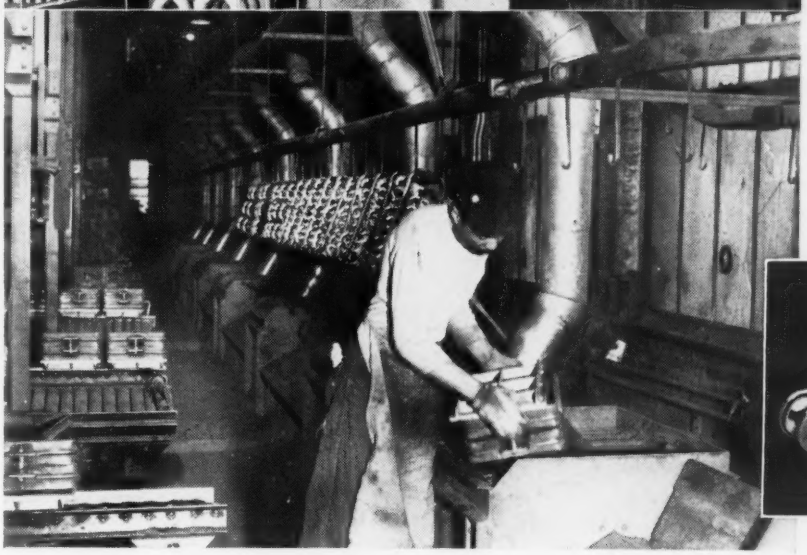
The Original Manufacturer of Automatic Controls For Sand Systems

Play safe!

Cut handling costs on cores and castings with R-W "Zig-Zag" Continuous Power Conveyors



• Zig-Zag Conveyor transferring baked cores from ovens to checking benches, eliminating hazardous lifting and danger of breakage.

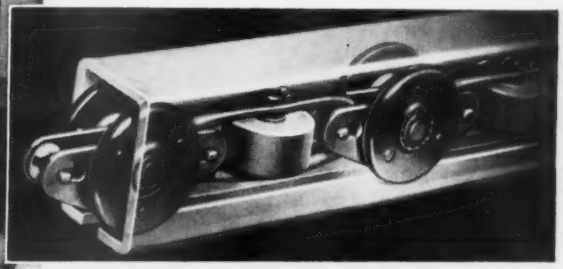


• Zig-Zag Conveyor carrying castings to cleaning room. Handles sand, flasks and castings. Effects remarkable savings in space, time, and maintenance costs.

You don't need to worry about breakage or production delays when your cores and castings are carried *overhead . . . swiftly, safely, economically* . . . on a ZIG-ZAG Continuous Power Conveyor. It travels up and down, in and out, and around, just like water through a pipe. ***Utilizes space that would otherwise be wasted;*** moves steadily and smoothly and requires less personnel. Breaks bottle-necks.

Save money with Zig-Zag

Find out, right now, how *you* can effect greater efficiency, lower costs in your core and casting departments with patented ZIG-ZAG. Write or wire today for consultation. No obligation to you.



Engineered for Economy and Flexibility—Horizontal and vertical units alternate in a continuous chain traveling through special steel tubing. Complete flexibility for installation in any plant. Easily installed, easily changeable to conform to plant alterations. Standard horizontal or vertical curves—two-foot radius. Low first cost, low power factor. SAFE—all moving parts enclosed.

75 YEARS of QUALITY and SERVICE for RICHARDS-WILCOX AURORA, ILLINOIS 1880 1955

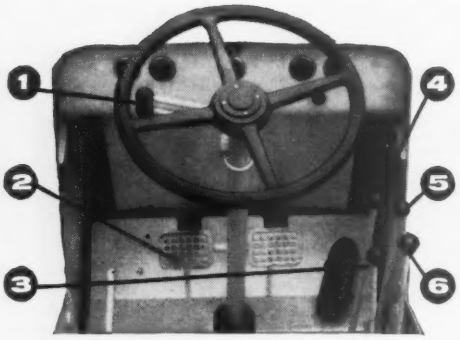
SLIDING DOOR HANGERS & TRACK • FIRE DOORS & FIXTURES • GARAGE DOORS & EQUIPMENT • INDUSTRIAL CONVEYORS & CRANES • SCHOOL WARDROBES & PARTITIONS •

Richards-Wilcox Mfg. Co.

MATERIALS HANDLING DIVISION
Branches in Principal Cities

466 W. THIRD STREET, AURORA, ILLINOIS

Faster, more power,
and LOOK, NO CLUTCH!



It's a pleasure to work here!

1. **Power-shift levers:** for Forward-Reverse and High-Low; make any shift while moving in either direction.
2. **That's no clutch!** It's a double-pedal brake, use it with either foot.
3. **Break-out bucket lever:** work the bucket in the pile—you've got two big double-acting bucket cylinders for tremendous breakout power, independent low-level tip back.
4. **Range Shift:** working or travel speed
5. **Drive Selector:** 4-wheel and 2-wheel
6. **Boom Control**

Until you see a MICHIGAN in action, you won't believe that it's possible to deliver so much power with such ease of operation. Your driver stays at peak efficiency all day long because there's no conventional clutch on a MICHIGAN. Instead, the MICHIGAN's exclusive power-shift transmission does all the shifting hydraulically—and eliminates the most notorious cause of excessive maintenance and driver fatigue.

In addition to effortless, instantaneous shifting, you get up to 300% torque multiplication on a MICHIGAN—from the Clark-built converter. With this kind of smooth, shockless power transmission, you get the full advantage of the MICHIGAN's extra weight and higher horsepower.

A demonstration (on your own job, if you wish) is the only way to get a real understanding of what this machine can do! Just write or call us—and don't forget that all MICHIGAN's are available on the low-cost MICHIGAN Lease Plan.

CLARK EQUIPMENT

CLARK EQUIPMENT COMPANY
Construction Machinery Division
442 Second St., Benton Harbor 28, Michigan
Phone: WA 6-6184

2 New fine FANNER CHILLS

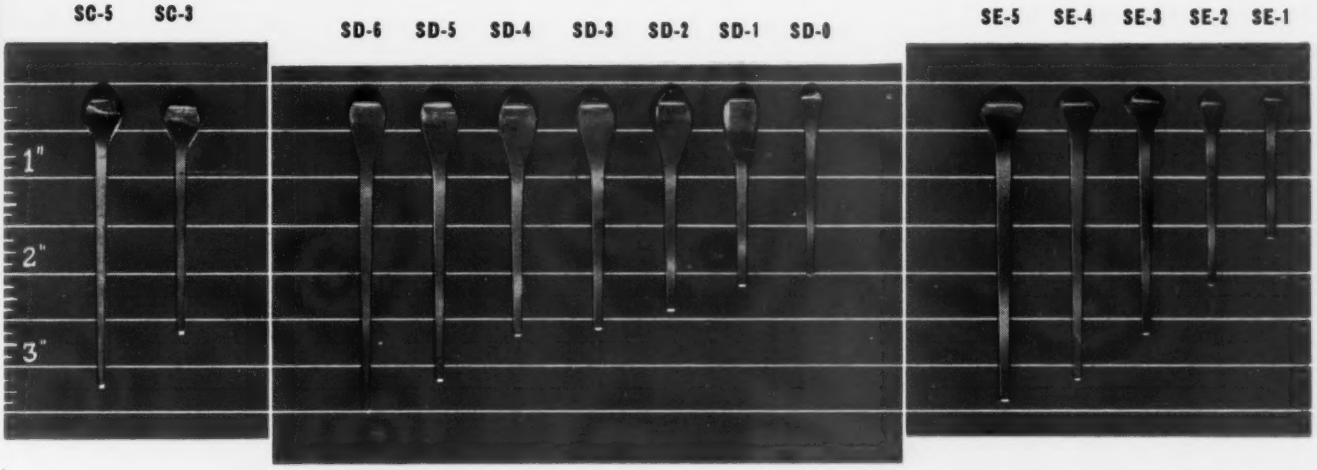
that improve casting quality . . . cut costs

• Since the introduction of these two new fine FANNER CHILLS a short time ago, the demand for additional types was so great, that several new types have been produced. Here for the first time you see the complete line of fine FANNER Superchillet and Fanchillet Chills. Each will result in better, sounder castings when used for its particular purpose.

fine FANNER Superchillet Chills

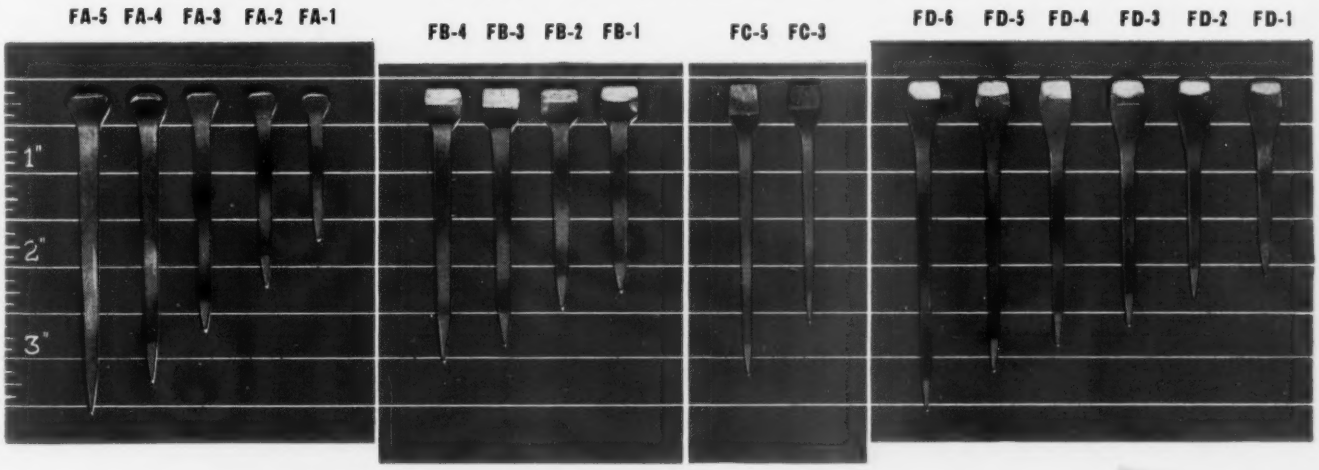
(patented)

• Superior in the pouring operation. Surfaces are correctly tapered so that gases, as fast as generated, are free to flow along surfaces without "pocketing." No sharp shoulders . . . more chilling volume per pound . . . better surfaces for molten metal to contact.



fine FANNER Fanchillet Chills

• Instead of conventional square head, the Fanchillet Chill has its sides tapered toward the top. Gases are free to flow along surfaces without "pocketing" . . . molten metal completely envelopes head. Costs less per pound than price per pound for which you sell finished casting.



• These scientifically engineered fine FANNER chills result in better, sounder castings every time. They are not "off-shoots" or by-products but are designed to produce proper chilling at lowest cost without "blows" . . . without "kicking away" . . . without defects caused by ordinary chills. SUPERCHILLET CHILLS and FANCHILLET CHILLS are available in the wide range of sizes and shapes shown above. Write for samples and prices. For other types of chills, also ask for FANNER Chill Catalog.

Send prices and samples

☐ SUPERCHILLET CHILLS

☐ FANCHILLET CHILLS

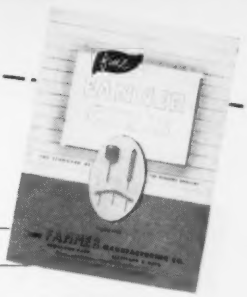
☐ Send Fanner Chill Catalog

FIRM_____

BY_____

ADDRESS_____

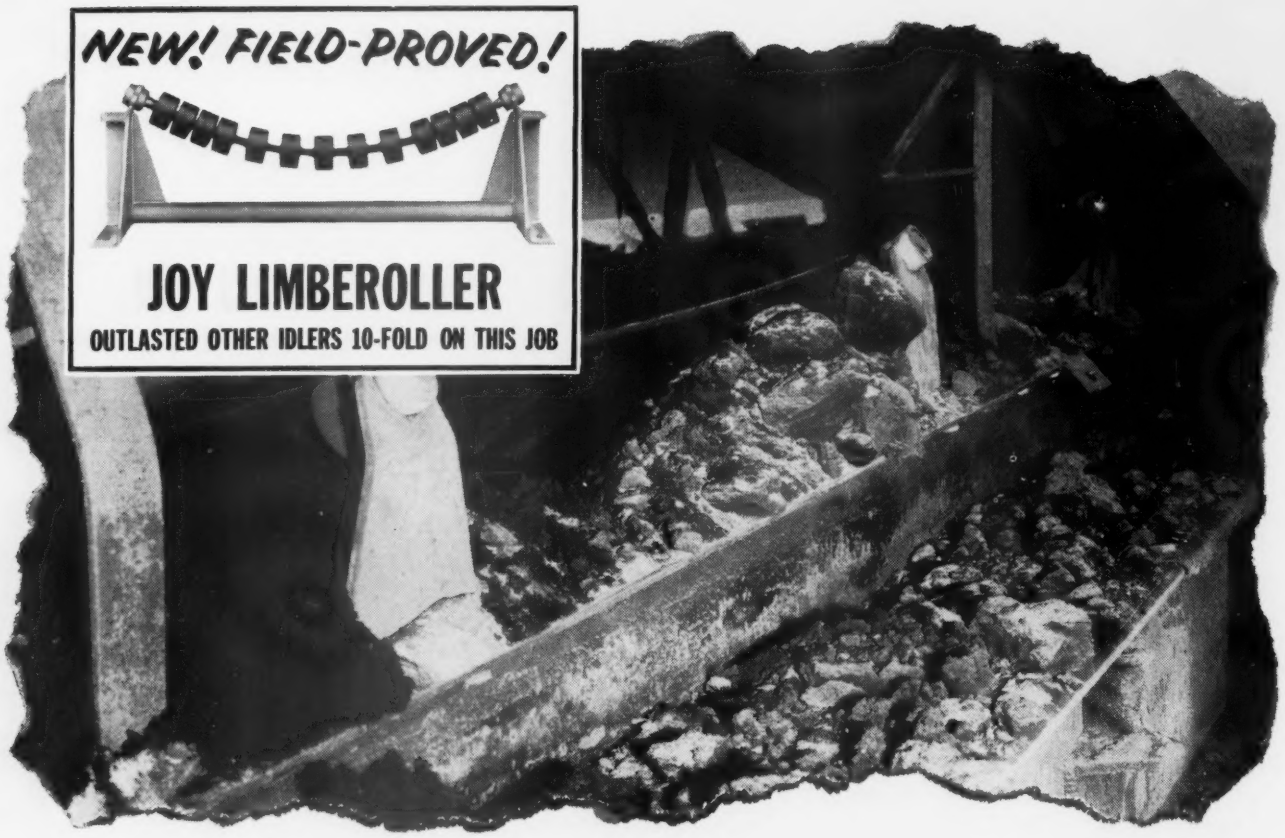
CITY & STATE_____



THE FANNER MANUFACTURING CO.

BROOKSIDE PARK **CLEVELAND 9, OHIO**

designers and manufacturers of Fine FANNER Chills



DO YOU HAVE CONVEYOR BEARING TROUBLES WITH HARD SAND OR OTHER ABRASIVE MATERIAL?

The Joy Limberoller idler installation shown above is in a magnesium foundry, supporting a 30″ belt which carries abrasive material up a 35° slope. *To date, these idlers have been on the job 10 times longer than conventional idlers previously lasted—and they're still going strong!*

ONLY 2 BEARINGS, UP OUT OF THE DIRT ...The Joy Limberoller idler consists of neoprene discs molded on neoprene-covered flexible steel cable. It is suspended from two bearings, one on each end, *out of the dirt zone.* This distinctive design, field-proved by thousands of idlers already in service, averts fouled idler rolls—protects the belt from damage—reduces your maintenance to a fraction.

OTHER ADVANTAGES, TOO . . . Joy idlers are self-training—they conform to the load with a cushioned grip which supports the loaded belt without slipping and reduces belt wear. They resist corrosion, abrasion, flame and grease—weigh ⅔ less than steel idlers, and handle bulk or packaged materials equally well. They're easily changed *without stopping the belt,* and compactly stored.

Whatever your belt conveyor job may be, let us help you to make it more efficient and economical. Joy Limberoller Idlers are available for belt widths of 18″, 24″, 30″ and 36″—and you'll find them easier, faster and less costly to install, maintain, knock down and move than any other conveyor idler on the market. ● ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

WRITE FOR COMPLETE DETAILS

Ask for free *Bulletin LD-103D.* It gives complete information on the unique Limberoller Idler, and we'll be glad to supplement it with engineering assistance on your particular problem.

Consult a Joy Engineer

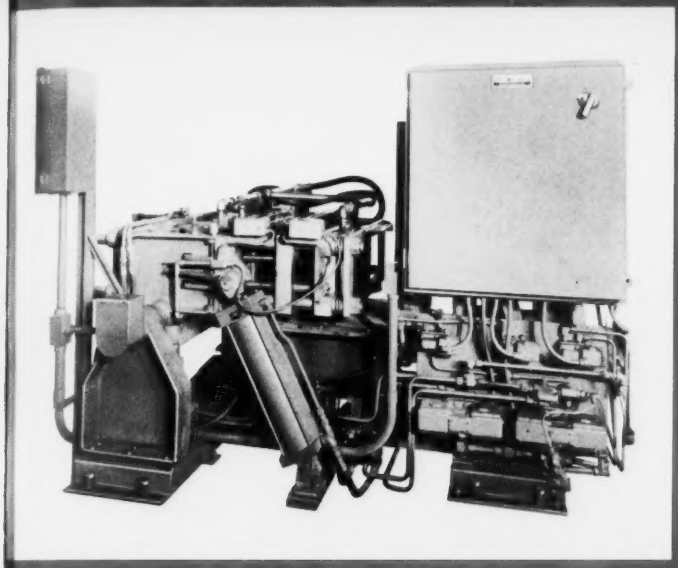
W&D 156968

JOY

SINCE 1851—OVER 100 YEARS OF ENGINEERING LEADERSHIP

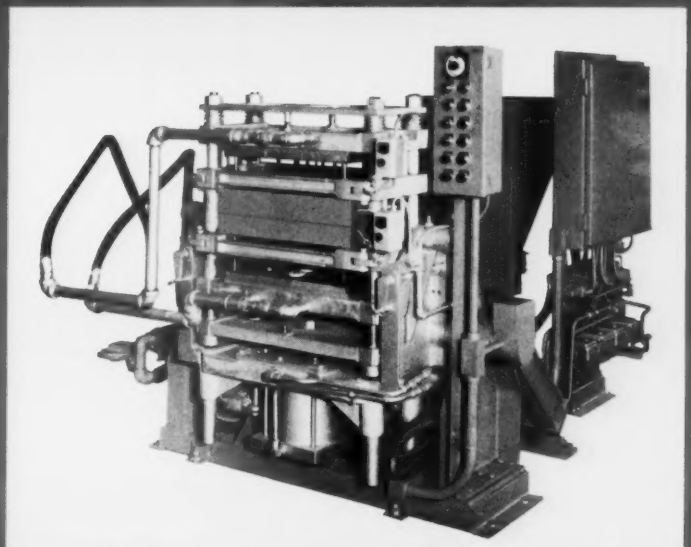
SUTTER SP-1300 New! AUTOMATIC

SHELL CORE and SHELL MOLD BLOWING MACHINE



BLOW POSITION

Here the Sutter SP-1300 has rocked down 90 degrees to blow position. Sand and resin mixture is blown into box cavities under pressure. After a pre-set investment time, the mixture is exhausted. Machine automatically rocks back to upright position.



CURE POSITION

This is the cure portion of the cycle. Split boxes are independently gas heated to assure proper temperature to each section, regardless of the size or shape. Adjustable timing permits the correct curing of the particular core or shell mold.

HOLLOW OR SOLID CORES

Blown and Cured Automatically

50-90 CYCLES PER HOUR

This single compact Sutter machine not only blows high quality, precision cores (solid or hollow) but fully cures them, too. And at a rate of 40 to 72 seconds per cycle!

Because this Sutter machine produces fully cured, resin-type cores, breakage is practically nil. Contrast this to the breakage that occurs when operators are handling green, oil-sand cores! Moreover, Sutter-made cores can be stored indefinitely without deterioration.

Consider also the vast amount of productive floor area you will gain when this Sutter SP-1300 eliminates all need for core ovens . . . think of the big reduction in investment, too.

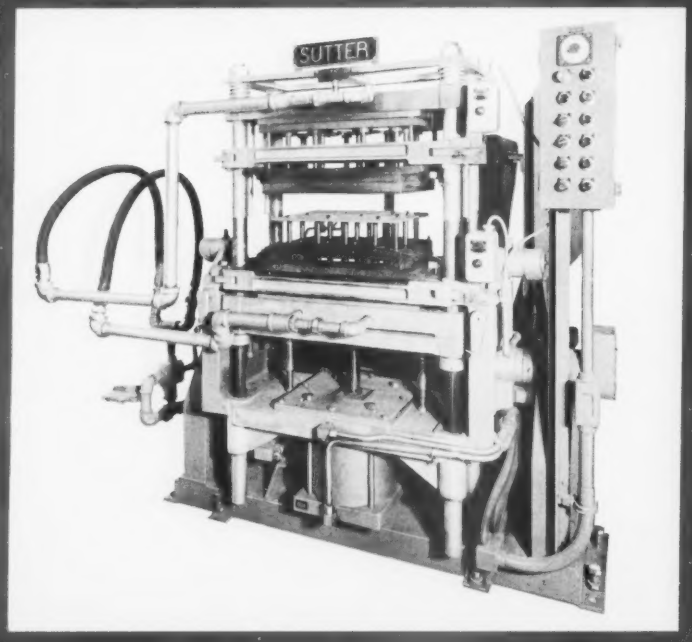
For complete details on this new money-saver for your foundry, simply call or write for Bulletin SP-1300.

SUTTER

BLOWS SHELL MOLDS, TOO

SEE OTHER SIDE

An Automatic SHELL MOLD Blowing Machine, Too!!



Shown here is the Sutter SP-1300 set-up for shell molding. After curing, the box opens and stripper pins lift the completed shell mold from the pattern for quick, easy removal. Cycle is ready to repeat.

Shown here are typical cores and shell molds that have been produced on the new Sutter SP-1300. Production can be switched from cores to shell molds easily and quickly thus providing a truly double-duty investment.

Specifications:

Maximum Box Size . . . . . **14" x 24" x 7"**

Maximum Draw . . . . . **7"**

Maximum Core or Mold Weight . . . . . **16 lbs.**

Production . . . . . **50-90 cycles per hour**

Shell molds produced on this machine are as accurate on the *outside* as the inside. With this method of production, thickness is accurately controlled making it practical for mechanical back-up during pouring. Sutter shell molds are also ideal for stack molding.

In addition to extreme versatility, these Sutter Automatic Shell Core and Shell Mold Blowing machines feature simplicity of design, rugged construction and the famous built-in dependability characteristic of all Sutter foundry equipment.

For all the facts and figures, send for your free bulletin SP-1300.

DO-40M-455

Creators of foundry equipment with NEW productivity

LIT9

SUTTER PRODUCTS COMPANY

2005 WESTWOOD AVE. • DEARBORN, MICHIGAN

Phone: LOgan 3-4400

Exclusive Canadian and Overseas Manufacturer and Distributor:

3M METHOD—better from start to finish

3M Representative helps aluminum foundry cut abrasive belt costs 54%

1081 cast aluminum cooking utensils per belt! Proof that 3M Coated Abrasives are production "tools," engineered to do better, faster grinding and finishing at lower cost to you.

Although Century Metalcraft Corp., Los Angeles, Calif., was satisfied with the way Three-M-ite Cloth belts were grinding the bottoms of "Guardian Service" cast aluminum cooking utensils, a 3M Representative saw a way they could profit by switching to "Wetordry" Type Belts. The new belts lasted so much longer that belt costs were cut 54%.

The 3M Representative also suggested using a Resin type belt for the finishing operation. Result: production per belt increased over 100% . . . from 461 to 1081.

Keeping customers up-to-date is an important job for the 3M Representative. Remember, he's a coated abrasives expert who can help *you* cut costs and increase production in *your* foundry. Send coupon today for additional information.

3M ABRASIVE BELTS

Made in U.S.A. by Minnesota Mining and Mfg. Co., St. Paul 6, Minn.—also makers of "Scotch" Brand Pressure-Sensitive Tapes, "Scotch" Brand Magnetic Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing, "3M" Adhesives. General Export: 122 E. 42nd St., New York 17, N.Y. In Canada: London, Ont., Can.

Send today for **FREE** *Booklet*

Minnesota Mining and Mfg. Co.
Dept. F-75, St. Paul 6, Minn.

☐ Send me free booklet on finishing non-ferrous metals
☐ I'd like to talk to a 3M Representative

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COMPANY_____

ADDRESS_____

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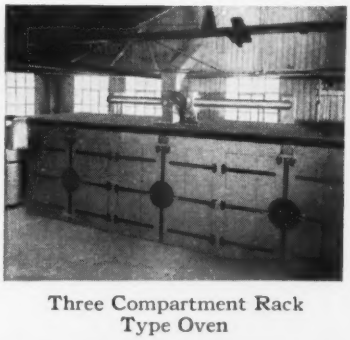
A LOT MORE THAN FANS DUCTS, HEATERS AND PANELS GO INTO . . .

LANLY FOUNDRY OVENS

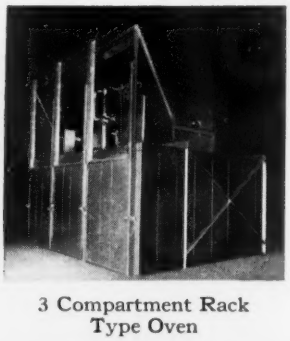
The proper adaptation and utilization of the essential component parts in every LANLY OVEN for maximum operating efficiency and economy, is a certainty being proved every day in foundries throughout the country. Specialized knowledge evolved from long experience and close cooperation with our customers enables us to design and erect better foundry ovens.

Upon receipt of information covering your needs, we will submit a proposal for an oven that will be thoroughly guaranteed as to construction and performance.

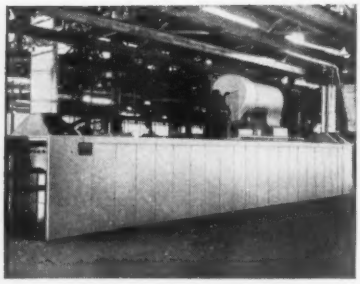
LANLY CAR TYPE OVEN featuring fast, uniform drying with low fuel consumption. Complete automatic operation. Sturdy construction yet pleasing in appearance. Comparative low initial cost.



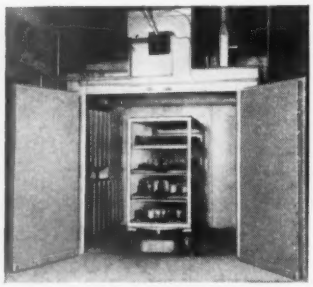
Three Compartment Rack Type Oven



3 Compartment Rack Type Oven



Continuous Core Blacking Oven



De-waxing Oven

Combination Rack and Drawer Type Oven

Plaster Mold Drying Oven

LANLY FOUNDRY OVENS

THE LANLY COMPANY • 780 PROSPECT AVE
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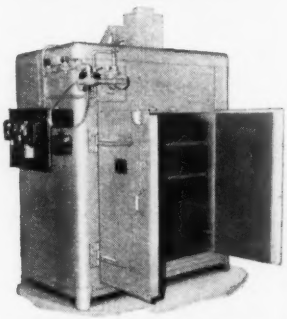
WRITE FOR THE LATEST CATALOG AND FACTS ON ANY INSTALLATION



Shelf Type Core Oven

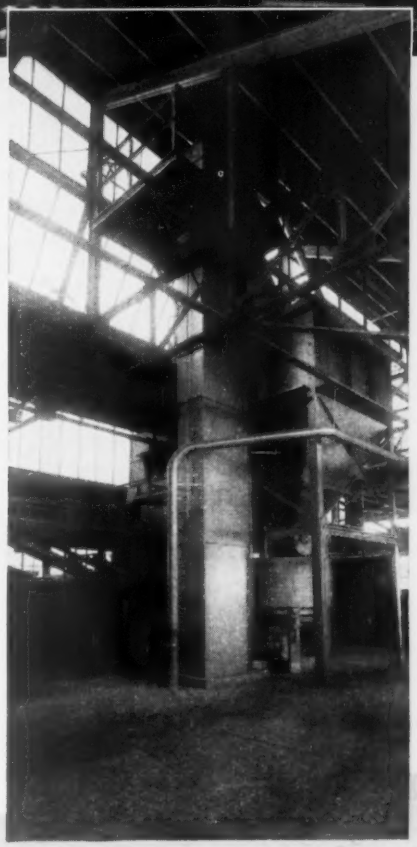
COMPLETE SAND HANDLING SYSTEMS

planned
designed
fabricated
installed
serviced

BY
NEWAYGO
ENGINEERING CO.

A complete sand handling system. Shakeout sand elevator, overhead storage, and mullers in background. Conditioned sand is delivered to overhead molding hoppers. Completed molds are set out on gravity conveyors for pouring from overhead monorail cranes. While the above systems show Gravity Conveyor Set-outs, Newaygo also furnishes pallet Car and Car Conveyor systems for mold handling. System handles 60 tons of sand per hour.

This unit is the heart of a sand handling system. Elevator carries shakeout sand to screen and bin conditioning unit. Sand passes into muller in batches as required. Prepared sand is delivered by conveyor to molding hoppers. This unit is designed for large or small systems.



are you planning a new or improved

Here are 4 important reasons why the NeWay plan is the right way and profitable way to modern, efficient, low-cost sand handling:

- *Free engineering* layouts, service and estimates *by practical engineers.*
- Single contract efficiency with one company responsible for fabrication, installation and erection.
- A complete staff of *service engineers* on 24 hour call.
- A 40-year record of proven ability.

NEWAYGO, MICHIGAN

ALSO MANUFACTURERS OF: The revolutionary new *Handy Sandy* and *Reddy Sandy*, complete package units for smaller installations. Write for literature.

YOU'LL DO A BETTER JOB

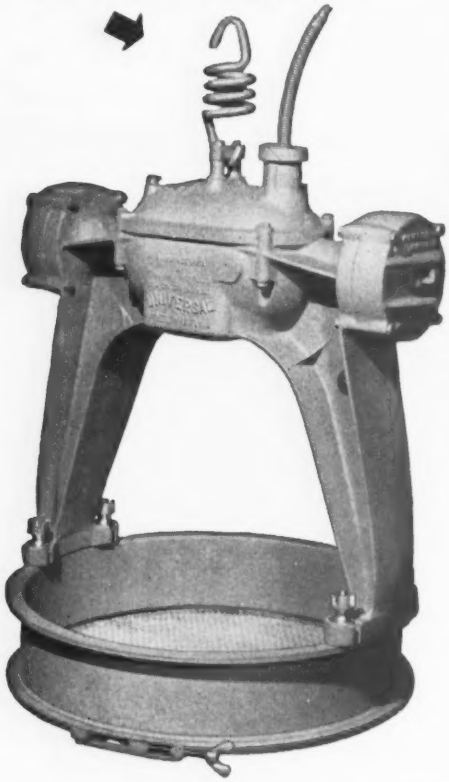
with **H. V. ADAMS DESIGNED**

HIGH EFFICIENCY FOUNDRY TOOLS

"UNIVERSAL FREE WHEELING"

FOUNDRY SAND RIDDLE

with the Double Eight Vibration

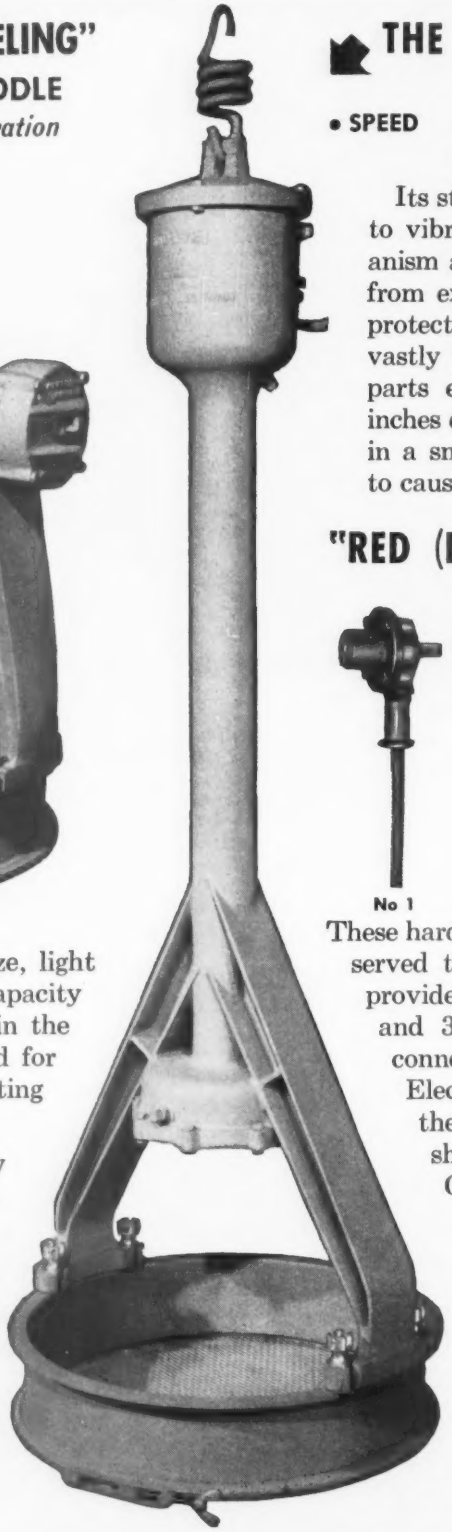


Because of its convenient size, light weight and good riddling capacity it long has been a favorite in the foundry. It also can be used for mixing core sand or for sifting sand directly into molds.

The mechanism is entirely enclosed protecting it from harmful dust and grit.

The main frame is cast in very strong tough aluminum.

It uses quick change ferruled sieves with 20 in. diameter sifting area. There are no loose wires to harm hands.



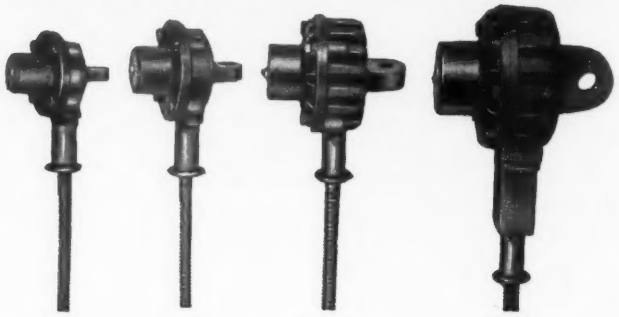
THE "ROTOPLANE" SPEED SIFTER

WILL GIVE YOU

- **SPEED**
- **ECONOMY**
- **SAFETY**
- **LONGER LIFE**
- **GREATER SIFTING CAPACITY**

Its sturdy one-piece frame and long shaft add to vibration effectiveness. The sealed-in mechanism assures protection of motor and bearings from exposure to dust and grit. This sealed in protection and "Rotoplane's" free-rotary action vastly increase bearing life. No exposed moving parts endanger the operator. Sieves have 20 inches diameter clear sifting area—are mounted in a smooth steel ferrule with no jagged edges to cause dangerous cuts and scratches.

"RED (Devil) ELECTRIC" VIBRATORS



No 1 No. 2 No. 5 No. 9

These hard hitting Adams designed Vibrators have served the foundries for over 30 years. They are provided with a 6 foot 3 wire authorized cable and 3 wire grounded connector which, when connected with our 3 wire grounded Red Electric Knee Switch, automatically grounds the vibrator protecting the worker from shock. The vibrators have passed the U. S. Government code inspection.

Other Foundry Products:

- **No. 11 NOISELESS TYPE VIBRATOR**
- **A-20 ELECTRIC VIBRATOR**
- **RED ELECTRIC KNEE SWITCHES**
- **"ROTO" ADJUSTABLE BIN VIBRATOR**
- **2 MIN. UNIVERSAL FINENESS TEST SIFTER.**
- **UNIVERSAL TRIPOD CARRIER**

ORDER ALL SIFTERS AND VIBRATORS WITH GROUND WIRE!!

FOUNDRY SUPPLIES MANUFACTURING CO., NOT INC.

2221 Orchard Street - Chicago 14, Illinois

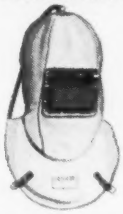
Established 1918 **Cable Address: "Rotoplane Chicago"** **H. V. ADAMS, Mgr.**

Where are the Achilles' heels in your safety program?

Pulmosan
RESPIRATORS

Dust, chemical cartridge, air supplied, and gas masks. Bureau of Mines Approved. Equipped with Hoods.

Pulmosan
HELMETS and HOODS



Dust, sand blast, air supplied, paint spray, acid splash, welding, Babbitting, etc.

Pulmosan
EYE PROTECTION

Goggles, spectacles, shields for grinding, chipping, welding, sparks, chemical splashes, fumes, smoke, etc.

Pulmosan
SAFETY CLOTHING

Gloves, mittens, aprons, sleeves, suits, spats, etc. Leather, asbestos, rubber, plastic, flame-proofed duck.

Have you provided equipment to protect employees against *every* possible industrial hazard inherent in your operation?

Does the equipment you have give the best available protection in each particular danger spot?

Safety allows no room for Achilles' heels. That's why PULMOSAN makes many hundreds of items of protective equipment of *all* types. In one of the PULMOSAN catalogs, you can be sure of finding the equipment that is specifically designed to cover each of your safety needs.

Experienced in selecting the correct equipment for the job, PULMOSAN offers you expert assistance in reviewing your safety needs. Your inquiries are invited.

WRITE FOR COMPLETE DESCRIPTIVE CATALOGS

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FIND THE CAUSE OF CRACKS

and you'll cut the COST of castings

With the black light of Magnaflux-Magnaglo, you can give a low cost check to each production step to find WHERE and WHY invisible cracks are being "built-in" your castings.

A high percentage of cracked castings doesn't just happen—there's always a reason. It may be in pouring, sprueing, shake-out, cleaning, handling, grinding or heat treating—even shipping.

But which step is at fault? why?

By answering these questions, non-destructive inspection with Magnaflux* can help you SAVE MONEY. By sample checking of the output from each production step, Magnaflux shows where the cracks *first* appear, helps you to find the faulty operation or process and suggests the remedy. Correction often involves only a minor change in production techniques. Result: production runs with almost no cracks.

How much you can save with Magnaflux naturally depends somewhat upon your own operation. In practically every case Magnaflux can help you to turn out better castings *at greater profit per casting.* Ask to have a Magnaflux engineer give you the facts and figures! They're interesting and enlightening! Set the date now!

*Magnaflux is a registered trademark of the Magnaflux Corporation.

MAGNAFLUX

MAGNAFLUX CORPORATION
7350 West Lawrence Ave. • Chicago 31, Ill.

New York 36 • Pittsburgh 36 • Cleveland 15
Detroit 11 • Dallas 19 • Los Angeles 58

IMPROPER HANDLING CAUSED THIS CRACK

White line on bell-end casting for an electric motor is a Magnaglo indication of a crack. Sampling inspection with Magnaflux showed handling methods were consistently causing this crack. With the cause located, correction was simple — production of sound castings increased.

Here are Complete facilities...

for your CAST AND MACHINED PARTS

City Pattern Foundry & Machine Company offers unparalleled facilities for the complete production of cast and machined parts. Working directly from your part print, we make the pattern, cast the parts and then precision machine them; all operations are performed right under our own roof.

TTING THE PATTERN IN PATTERNS

In every phase of the processing the most modern methods and equipment are used. And to safeguard consistent high quality, every known piece of inspection equipment is on hand to chemically, physically and dimensionally measure your parts before shipment.

Thus, complete responsibility for your cast machined parts are in the hands of one competent, completely equipped source. Why not take advantage of the obvious benefits next time *you* are ordering cast and machined parts.

Since 1913...

CITY PATTERN
FOUNDRY AND MACHINE CO.

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Fremont MAGNESIUM FLASKS

The Way to

MORE EXACTING WORK

Accurately machined inside surfaces and flanges. Steel faced top and bottom flanges.

LONGER SERVICE

Magnesium has twice the tensile strength of aluminum.

EASIER HANDLING

Magnesium weighs 1/3 less than aluminum.

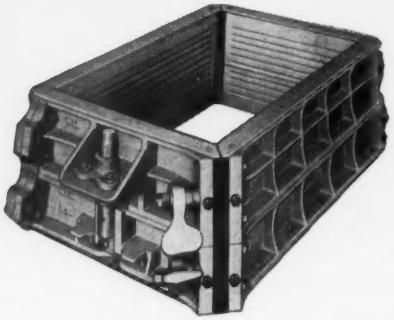
All orders given prompt attention. Write today for literature.

THE FREMONT FLASK CO.

FREMONT, OHIO

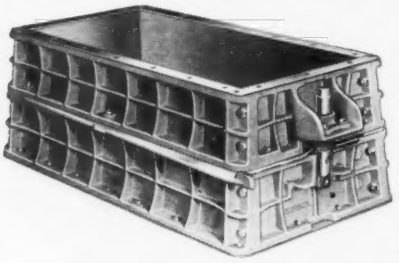
The New

FREMONT SPREADLOCK FLASK



Long-life, easily replaceable, live rubber corner inserts completely close the corner gaps so that no sand can lodge in the open corners.

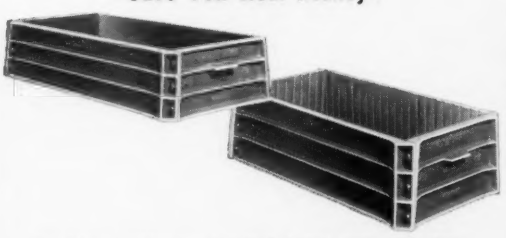
FREMONT STANDARD SLIP FLASK



The one-inch **GROOV-LOCK FOOLPROOF PIN**, particularly adapted to cope or drag pattern jobs, guarantees perfect alignment indefinitely. (Other types of standard pin fittings available.) Solid, bolted and welded corner construction.

FREMONT CAST IRON OR CAST ALUMINUM JACKETS

Save You Real Money!



Precision machined and drilled, bolted corner construction permits easy insertion of new sides or ends. The entire jacket need not be scrapped. Standard style for ordinary foundry practice. Grooved style, which permits ready gas escape, for steel foundries. Flasks and jackets can be assembled on 3°, 4°, or 5° taper.

PUT MUSCLE BEHIND YOUR BLAST CLEANING

Is your present abrasive rugged enough to prove itself in performance? You can't judge an abrasive by looks, claims or promises. The only test of any abrasive is its *cost per ton of castings cleaned.* Because of exclusive metallurgical characteristics, Malleabrasive gives you the lowest cost per ton cleaned of any premium abrasive on the market! This has been proved in hundreds of production tests by users throughout the country. Prove it in your own production test—put muscle behind *your* blast cleaning with Malleabrasive! *We GUARANTEE that Malleabrasive will give you lowest cost per ton of castings cleaned.*

To order Malleabrasive, or for more information on running a test, contact Pangborn Corp., 1400 Pangborn Blvd., Hagerstown, Md.

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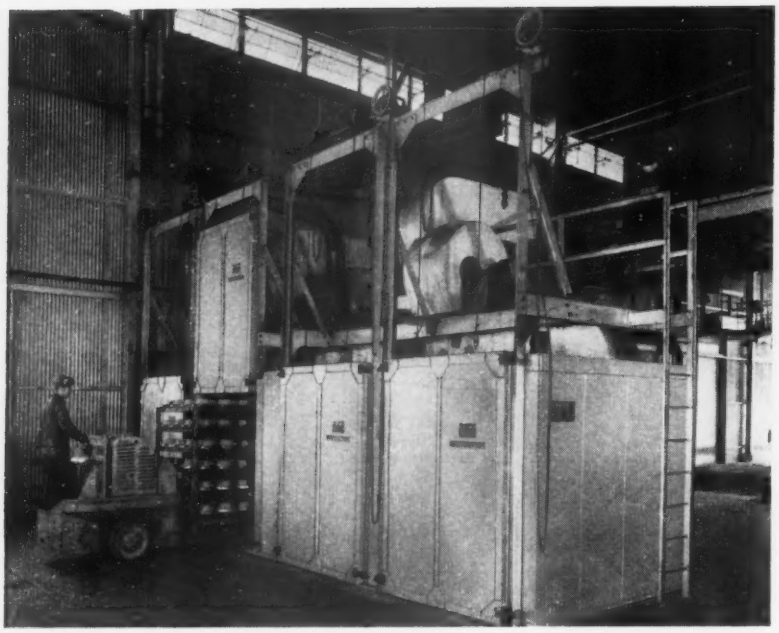
(Other patents pending)

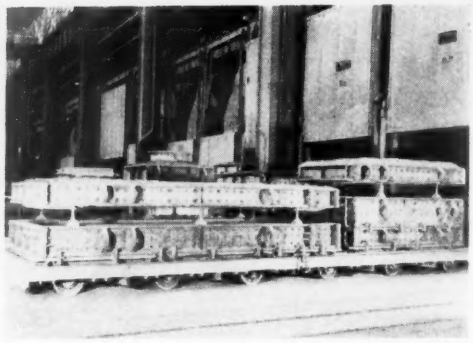
Lower foundry costs begin with...

COLEMAN OVENS

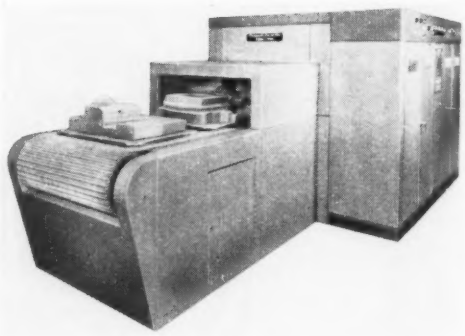


Coleman Transrack Ovens

Coleman Tower® Oven



Coleman Car Type Mold Ovens



Coleman Dielectric Oven

The principal way of cutting costs in your coreroom is to get correctly baked cores and properly dried molds every time! Otherwise the efficiency of your core or mold making equipment, the skill of your labor and the best materials are wasted!

To reduce casting scrap, to save on labor, fuel and material, to produce consistently good castings, you need the best core baking and mold drying ovens available—Coleman!

Coleman Core and Mold Ovens are as fine as modern engineering and *more than a half a century* of specialized foundry experience can make them. Users are amazed at the improvement Coleman Ovens provide in uniform heating, accurate control, efficient work handling and dependable performance.

With production savings so important to profits, it will pay you to investigate the unusual advantages of Coleman Ovens now! *As builders of the world's only complete line of foundry ovens, we have no reason to recommend any but the best oven suited to your purpose.* For better castings at lower cost let our experienced Engineers give you practical recommendations for your particular requirements.

WRITE FOR BULLETIN 54

A COMPLETE RANGE OF TYPES AND SIZES...

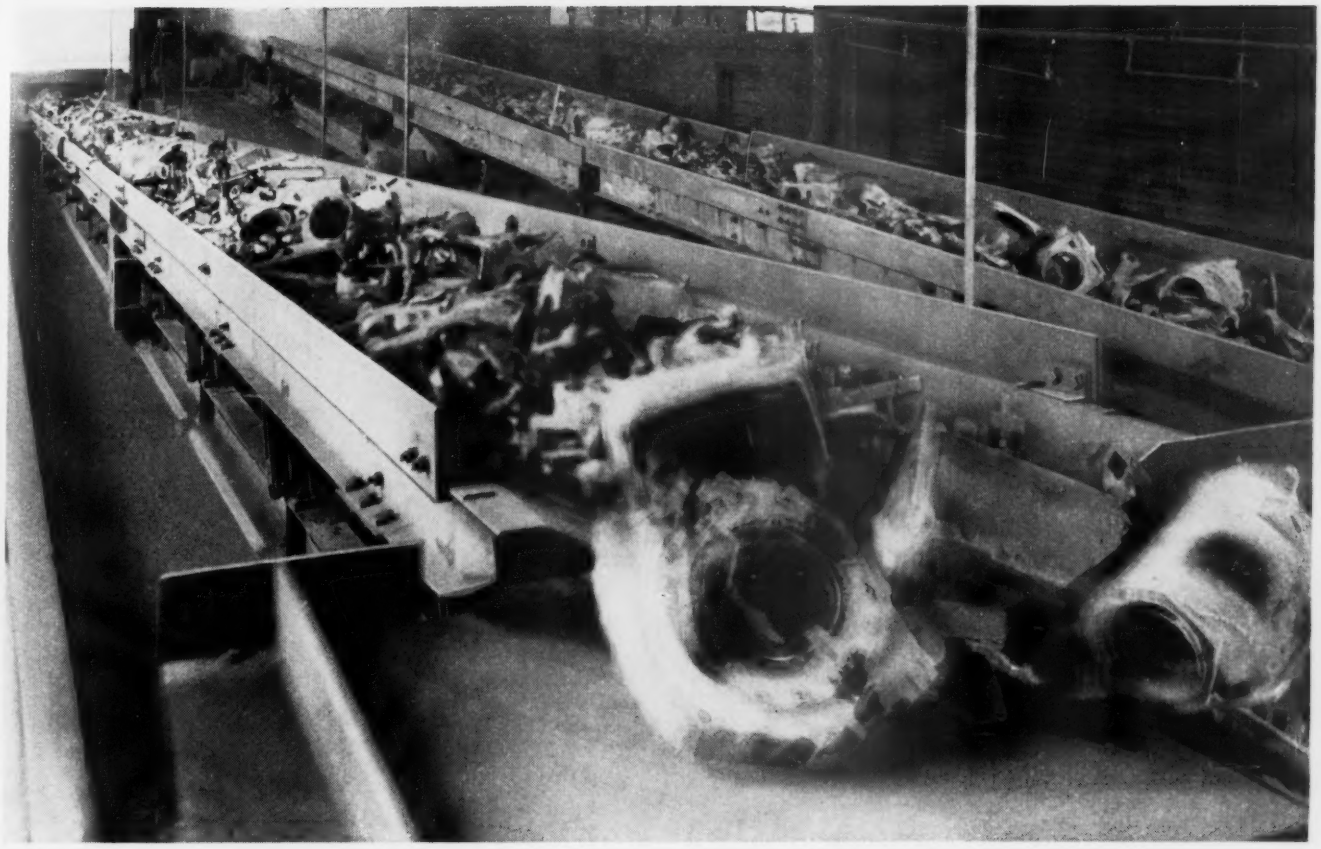
for every core baking and mold drying requirement:

Tower Ovens • Horizontal Conveyor Ovens
Car-Type Core Ovens • Car-Type Mold Ovens
Transrack Ovens • Rolling Drawer Ovens
Portable Core Ovens • Portable Mold Dryers
Dielectric Core Ovens

MEMBER FEMA

THE FOUNDRY EQUIPMENT COMPANY
1821 COLUMBUS ROAD CLEVELAND 13, OHIO

WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS



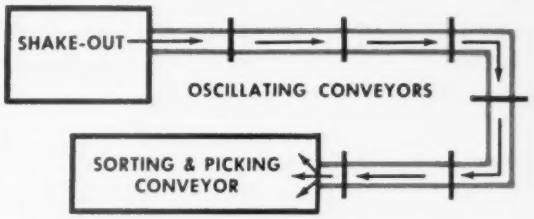
Large foundry mechanizes with 1650 ft. of LINK-BELT Oscillating Conveyors

Trouble-free system has capacity for cooling 400,000 tons of gray iron castings annually

PLANNING with this foundry's engineers, Link-Belt specialists found that the best cooling arrangement involved gentle movement of castings by oscillating conveyors up a 5-degree incline from shakeout to sorting. They designed a system of Link-Belt oscillating conveyors which permits continuous material flow . . . has brought safer, cleaner working conditions in the bargain. What's more, this gentle handling has eliminated damage to castings experienced in other types of conveyors in discharging from one unit to another.

Better cooling of castings on oscillating conveyors is but one phase of foundry engineering and equipment pioneered by Link-Belt. Our engineers can plan an entire conveying and sand preparation system for you . . . and follow through with a complete line of quality equipment to help you produce better castings at lower cost.

Whether you need one machine or complete engineering, call your nearest Link-Belt office. Be sure to inquire about stock availability of standardized sections of 36-in. oscillating conveyors, that cut both costs and delivery time. Also, get Book 2423 for complete information on Link-Belt's broad line of foundry equipment.



Layout of typical foundry oscillating conveyor application

AT LARGE MIDWEST FOUNDRY, gray iron castings cool on 48-in. Link-Belt oscillating conveyors specially designed for gentle handling and cooling of hot castings —operating at 12 to 15 ft. per minute. Positive action, constant-stroke eccentric moves materials in uniform flow regardless of surges. Other 36-in. wide oscillating conveyors are also important in this foundry's operations.

LINK-BELT

13,758

CONVEYORS AND PREPARATION MACHINERY

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

here's why

MORE FOUNDRYMEN PREFER PURITE TRADE MARK ....

"Purite gives 100% fluxing action in the cupola—100% desulphurizing action in the ladle."

"Purite permits the use of higher-sulphur raw materials."

"Purite comes in uniform 2-lb. pigs—no weighing or measuring required."

"Purite can be shipped in bulk carloads at substantial savings over bag shipments—is easily stored without deterioration."

"Purite is time-tested and proved for rapid and unsurpassed desulphurizing uniformity."

"Purite is 100% pure fused soda ash—you do not pay for inert materials."

"Purite produces higher percentages of finished castings—fewer rejects per ton of metal poured."

"Purite does not crumble—is easy to handle—no waste, no dust."

"Purite, the scientific flux for better melting and cleaner iron, is sold by leading foundry supply houses in the United States and Canada."

MATHIESON

MATHIESON CHEMICALS
OLIN MATHIESON CHEMICAL CORPORATION
INDUSTRIAL CHEMICALS DIVISION · BALTIMORE 3, MD.

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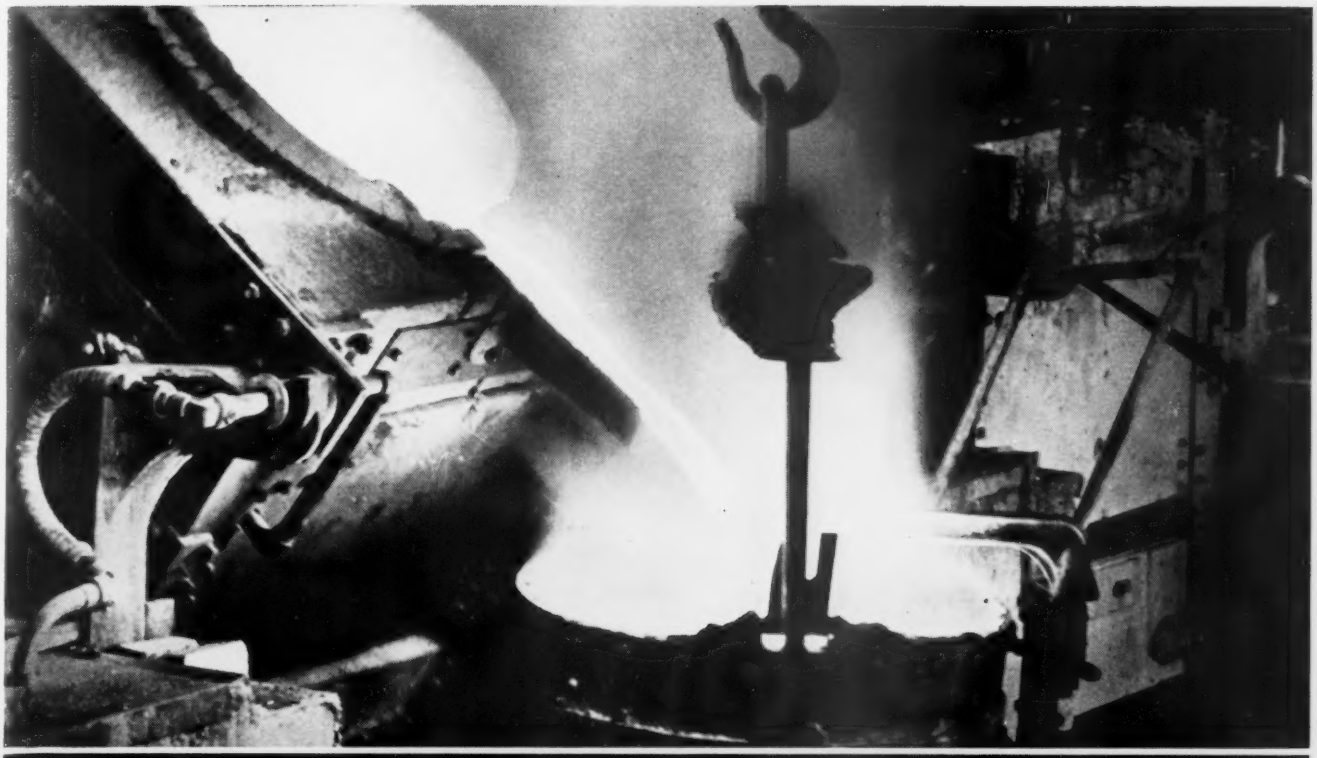


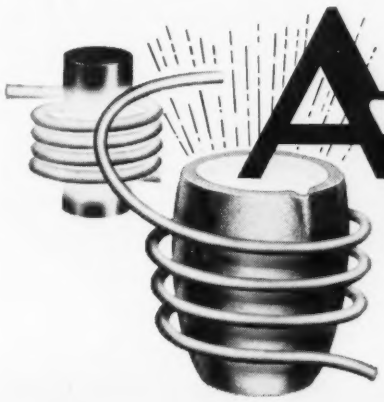
6 tons of steel melted and poured every 2½ hours

SPEED . . . CONTROLLED QUALITY . . . ECONOMY —these advantages are enjoyed on every melt, ferrous or non-ferrous, in Ajax-Northrup induction furnaces. This furnace for example, turns out a six-ton charge of nickel alloy—precisely alloyed and virtually free of impurities—every 2½ hours.

Ajax induction melting puts substantially all the heat in the charge proper. No power is wasted in superheating crucible or refractory, and little heat escapes into the room. Speed of melting and electromagnetic stirring insure perfect alloys every time.

Ajax has been building induction furnaces for all metals since 1916. Installations capable of producing up to 20,000 pounds of metal per hour are in operation, and more and more foundries are switching to Ajax-Northrup melting as they discover its economy and advantages. Learn why in Bulletin 27-B, available upon request to Ajax Electrothermic Corporation, Trenton 5, New Jersey.

Associated Companies: Ajax Electric Company—Ajax Electric Furnace Co.—Ajax Engineering Corp.



AJAX NORTHRUP SINCE 1916

INDUCTION HEATING-MELTING

let's look at the figures

When it comes to choosing the right core oil for making your casting, there are 10 figures to check before making your decision. They are the 10 reasons why there is a grade of Penolyn Core Oil to meet the most exacting requirements of every Foundry and Core Room practice. Look at the figures and you'll—

If you require expert technical assistance or technical data regarding your present or future casting operations, just call the Penola Office nearest you.

Penola

specify PENOLYN CORE OIL

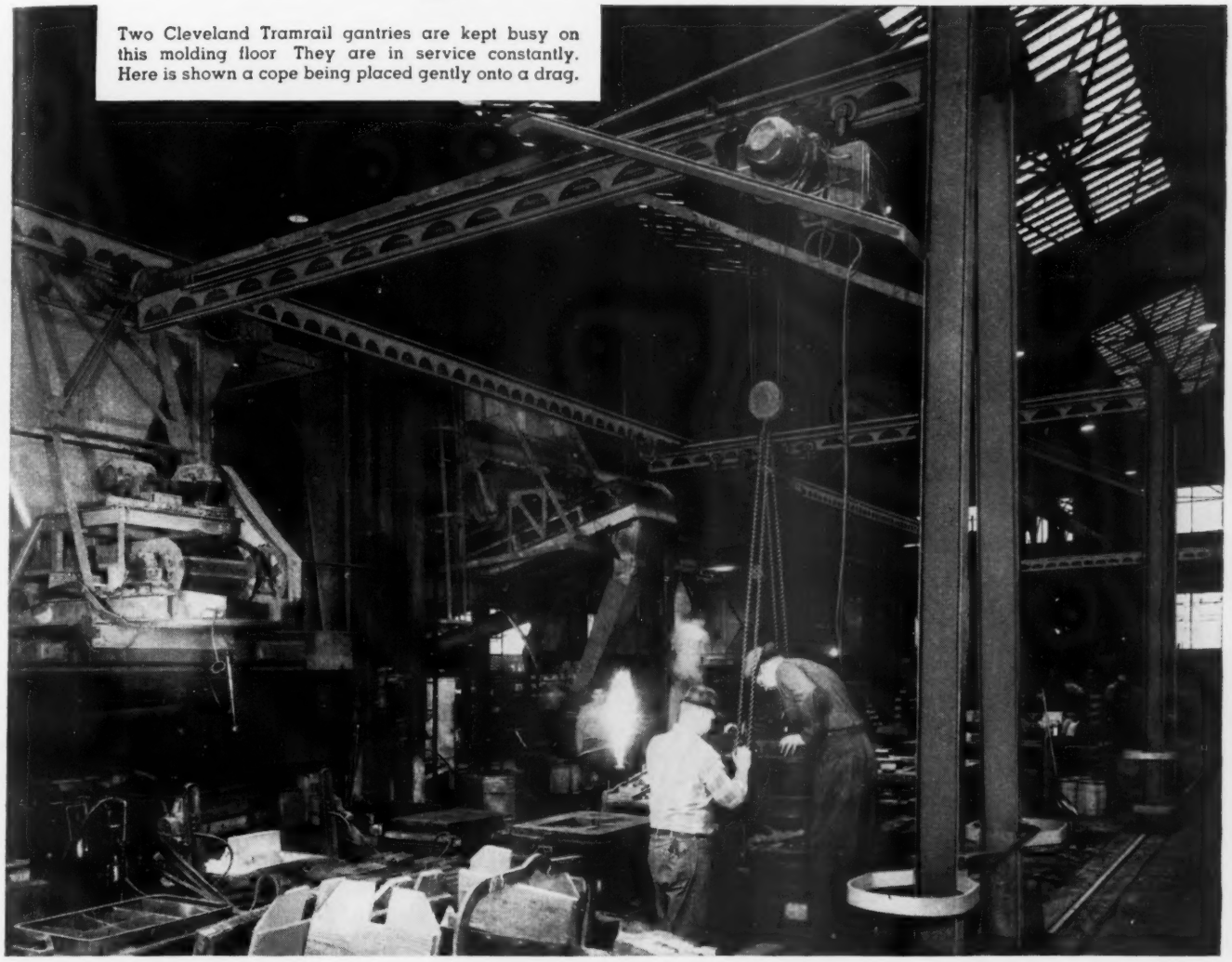
for these 10 important casting advantages:

1. Dependable uniformity
2. Concentrated form
3. No obnoxious odor
4. Seepage eliminated
5. No crusting, green mix
6. Always clean working
7. Wide temperature range
8. Polymerized formulation
9. Minimum gas
10. Ample collapsibility

PENOLA OIL COMPANY • NEW YORK • CHICAGO • DETROIT

Gantries Expedite Production

For Largest Western Foundry



Two Cleveland Tramrail gantries are kept busy on this molding floor They are in service constantly. Here is shown a cope being placed gently onto a drag.

FOR many years Cleveland Tramrail gantry cranes have been used for various foundry handling operations at the Pacific Car & Foundry Company, Renton, Washington, whose foundry is reputed to be the largest west of the Mississippi River.

The cranes have proven a tremendous aid in obtaining maximum production and easing the work by eliminating much of the former heavy manual lifting and moving of materials. Because their design permits their operation under heavy overhead traveling cranes, the gantries can be placed wherever lifting and handling service is needed to take care of local work areas.

Gantry cranes are one of many types of Cleveland Tramrail equipment which offer opportunities for foundries to expedite production and make substantial savings.

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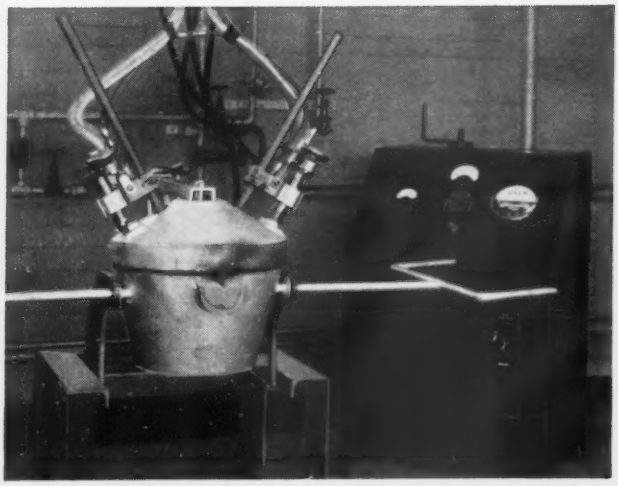
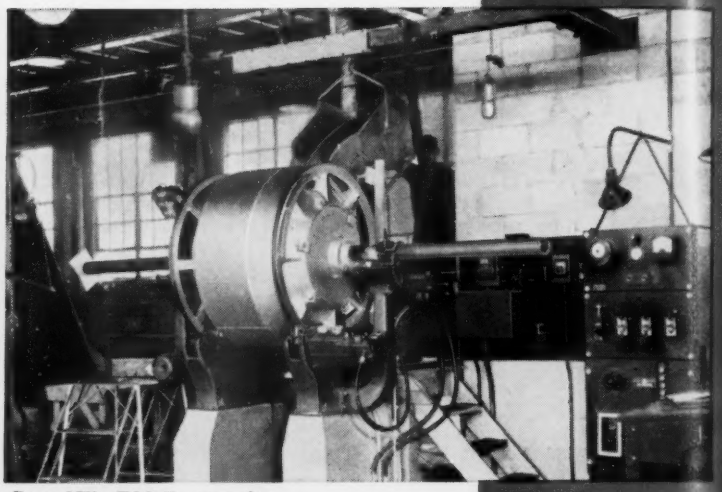
BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3838 East 286th Street, Wickliffe, Ohio.

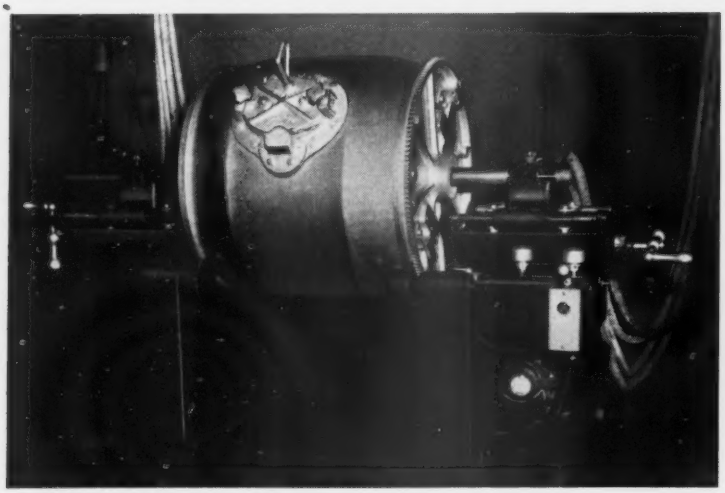
CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT



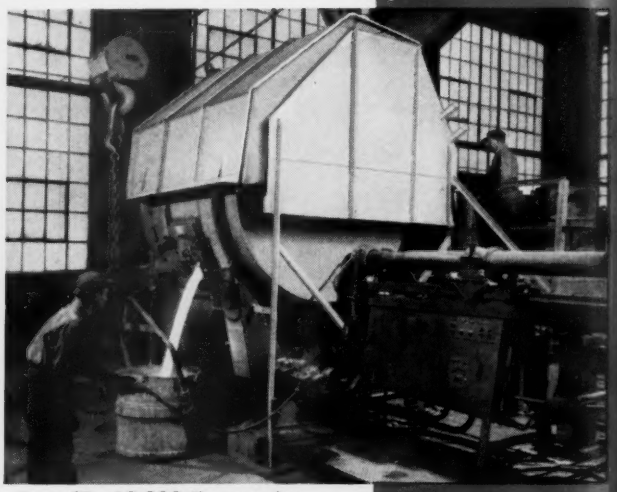
Type PT—15-lb. capacity



Type LFY—700-lb. capacity



Type GMS—60-lb. capacity



Type CP—10,000-lb. capacity

DETROIT ROCKING ELECTRIC FURNACES

can melt metal efficiently for you, too

The list on the opposite page testifies to the versatility of these great furnaces. Hundreds of high quality products, in bronze, brass, iron and ductile iron, are cast from the efficient flow of metal produced by Detroit furnaces.

The indirect arc, free of the molten metal at all times, produces alloys of precise analysis in melt after melt. Rocking action results in maximum heat transfer, optimum utilization of power.

Detroit Rocking Electric Furnaces are capable of doing many jobs well. One furnace, equipped with extra shells, can melt a variety of metals and alloys. Interchange of shells is quick and easy, and the savings in installation work, transformers, wiring and floor space is large and important.

Capacities of Detroit Electric Furnaces range from 10 to 10,000 pounds.

Send us your operating data. Let our engineers show you how a Detroit Electric Furnace will meet your needs.

MEMBER FEMA

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Foreign Representatives: in BRAZIL—Equipamentos Industrias, "Eisa" Ltd., Sao Paulo; CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi Inc., 150 Broadway,

ATTRITION MILLS AND GRINDING PLATES . . . BERYLLIUM COPPER MASTER ALLOYS . . . BRASS AND BRONZE PLUMBING GOODS . . . BRONZE BEARINGS AND BUSHINGS . . . BRONZE TEXTILE MACHINE PARTS . . . COAL STOKER PARTS . . . DIALS AND GAUGES . . . DIES . . . DUCTILE IRON PARTS FOR CEMENT MIXERS, LAWNMOWERS AND ORDNANCE MATERIAL . . . HIGH STRENGTH IRONS FOR AUTOMOTIVE PARTS . . . JET ENGINE PARTS . . . MALLEABLE IRON AGRICULTURAL IMPLEMENTS . . . MASTER ALLOYS AND INOCULANTS . . . NAVAL ORDNANCE BRONZES . . . NICKEL ANODES . . . OIL WELL PUMP LINERS . . . PARTS FOR ELECTRICAL PRECIPITATORS . . . RECOVERY PROCESSING OF METALLIC DROSSES . . . SPECIALTY STEELS . . . TOOL STEELS . . . TOOLS . . . WELDING ROD ALLOYS.

ELECTRIC FURNACE DIVISION

Electric Company, Bay City, Michigan

New York 7, N. Y.; MEXICO: Cia Proveedora de Industrias, Atenas 32-13, Apartado 27A3, Mexico 6, D. F., Mexico; EUROPE, ENGLAND: Birlec, Ltd., Birmingham.

702-3C
Fiberglas*
Welding Helmets

706-3C

These seamless all-plastic helmets are light, exceptionally strong, moisture proof, non-warping, heat resistant and easily sterilized. A new type "S" four position stop provides a strong, simple and quick adjustment for the individual wearer. No. 702-3C supplied with No. 1085 Insulated Steel Glass Holder. Includes Filterweld Plate and Clear Cover Plate. No. 706-3C has No. 1096 Insulated Dowmetal Lift-Front Glass Holder.

*Reg. T.M. Owens Corning Fiberglas Corp.

124SB-2
Straightaway*
SOUND PROTECTORS

A real advance in muffling industrial noise. Increases efficiency, cuts compensable claims. Effective in both low and high frequency ranges. Headband type shown is for "on and off" or moderately lengthy use. Adjustable padded headband spring. "No-metal" connection unit. Designed so cups stay snugly, comfortably in place.

(Headband type with built-in earphones also available. Also helmet types)

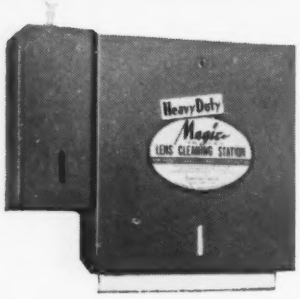
*T.M. Reg. by David Clark Company

AO†

Quality Specialty Products Do the Job — Check Your Needs Today!

100C Safeticote Skin Protector and Cleaner

Cuts absenteeism due to dermatitis. Protects workers' skin all day — washes clean in a jiffy. Mildly antiseptic. Contains lanolin. For protection against cutting oils, lubricants, paints, etc. Available in jars and tubes.

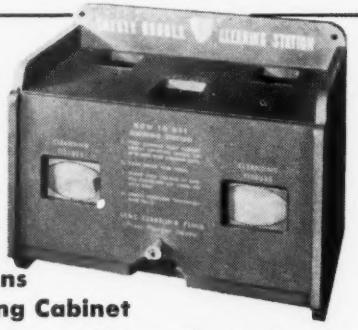


851 Heavy Duty Cleaning Station

For coal mines, foundries, packing houses, canneries. Use for plastic goggles, safety shields, any protective surface. Fluid is pressure packed. No pump, fuss or mess. Very economical in use. 20 gauge steel container. Pilfer-proof. Provides for tissue disposal. Unit consists of dispenser, cleaning and anti-fog fluid and jumbo size filling of paper.

850 Magic Lens Tissue (Silicone Treated) and Compact Dispenser

Steel dispenser can be installed on any smooth surface. The handy, thrifty way to keep glasses clean, clear, polished. Tissue is strongly tear-resistant, sheets are 50% larger than customary. Comes with 6 packages of tissues.



750 Lens Cleaning Cabinet

Wood. 12″ long, 9″ deep, 6″ high. Has all necessary cleansing and anti-fog materials. Simply attach to wall. Comes with 120 cleaning tissues, 1 oz. jar of AO Anti-Fog, 6 oz. bottle and sprayer. Order lens fluid separately.

American Optical
SAFETY PRODUCTS DIVISION

Your nearest AO Safety Products Representative can supply you.

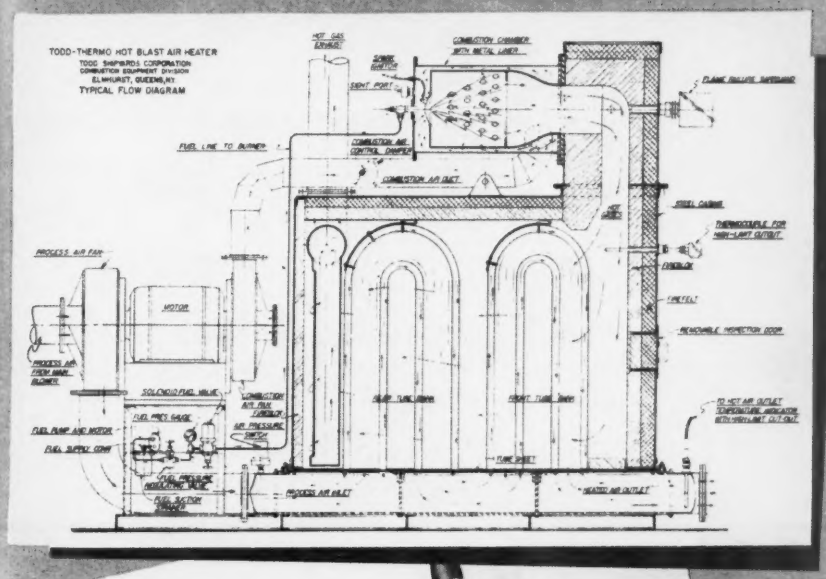
SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

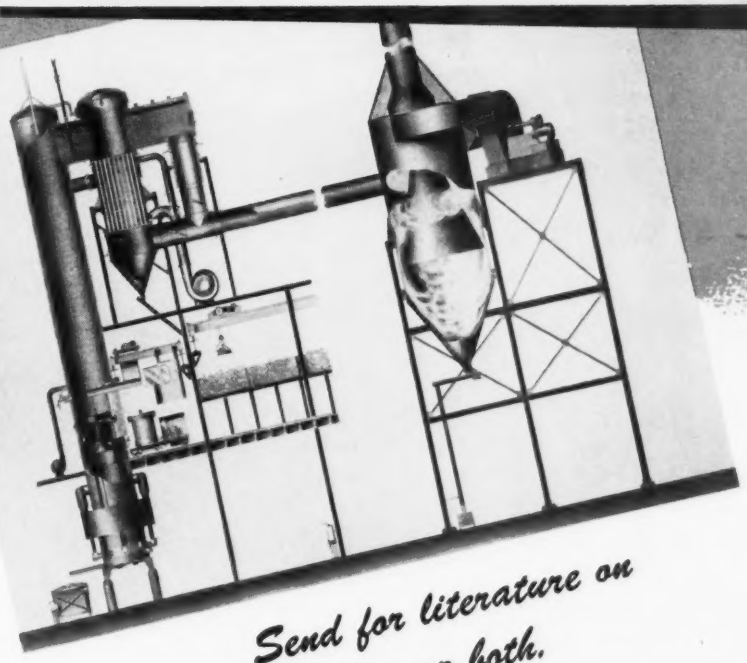
†T.M. Reg. by American Optical Company

NOW

a full range of HOT BLAST service

. . . MADE POSSIBLE WITH OUR APPOINTMENT AS EXCLUSIVE AGENTS FOR TODD-THERMO HOT BLAST HEATERS IN THE FOUNDRY INDUSTRY





TODD NEW YORK U.S.A.

Direct-Fired

TODD-THERMO Hot Blast Heater, utilizing gas or oil for fuel, employs a floating type exchanger section, composed of two or more banks of "U" or hairpin staggered tubes. Front bank of tubes, at which point the severe (highest) inlet temperature is encountered, is made of especially selected alloy metals.

Compactness and Efficiency

are reflected in TODD-THERMO Hot Blast Heaters which, in a few minutes, will heat pure uncontaminated air, of any foundry required volume, up to 1000° F., at small operational cost, with practically no maintenance.

Grindle

. . . Recuperative

GRINDLE RECUPERATIVE Hot Blast, utilizing waste gases from the cupola, is normally used in conjunction with dust collecting equipment. The cupola is capped, converting the upper section of stack into a combustion chamber in which the waste gases are ignited.

Resultant heat is drawn vertically downward through a single-pass heat exchanger. Much of the coarse particulate matter drops out in this unit and is collected in the bottom cone. Waste gases then pass on to the selected type of collector . . . electrostatic precipitator, baghouse, or Vortex.

EITHER TODD OR GRINDLE ENGINEERS ARE AVAILABLE FOR CONSULTATION WITHOUT OBLIGATION.

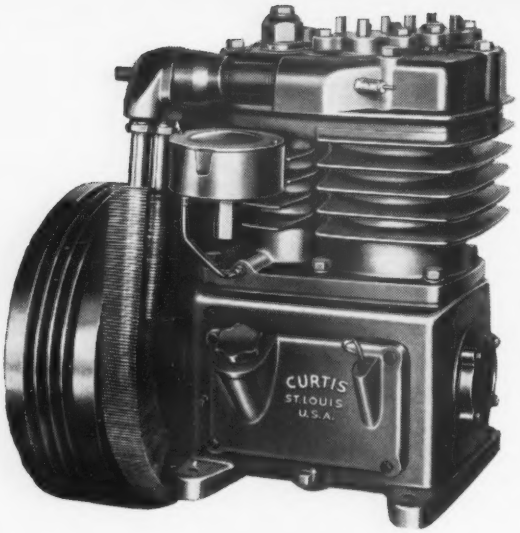
Send for literature on either, or both, today!

GRINDLE CORPORATION

15401 PARK AVE., HARVEY, ILLINOIS

Cut your costs with *Curtis*

AIR COMPRESSORS
AIR HOISTS
AIR CYLINDERS



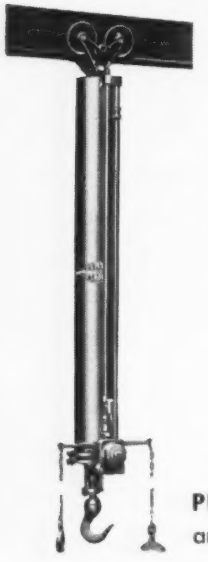
A plentiful supply

of air to speed production throughout your plant is assured with powerful, precision-built *Curtis* Air Compressors.

- **air-cooled, two stage—¼ to 20 H.P. inclusive**
- **water-cooled, single stage—20 to 50 H.P. inclusive**
- **Timken tapered main bearings permit easy external adjustment**
- **long-life pressure-lubricated connecting rod and piston pin bearings**

Tank-mounted compressors in sizes from ¼ through 15 H.P. inclusive (1 to 78 cu. ft.)—also available in base-mounted type.

Simple and base-mounted compressors from ¼ through 50 H.P. inclusive (1 to 300 cu. ft.).

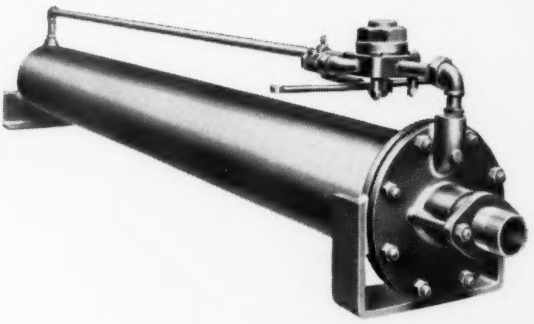


LIFT, LOWER, PUSH or PULL

easily, economically and safely with *Curtis* Air Hoists and Cylinders . . . capacities up to 10 tons.

- **lower initial cost**
- **lower maintenance costs**
- **smooth operation and precision control**
- **self-closing, rotary disc self-grinding valves**

PENDANT AIR HOISTS . . . ideal for any lifting or lowering operation.



BRACKETED AIR CYLINDERS . . . can be mounted horizontally or vertically for lifting, lowering, pushing or pulling.

FOR COMPLETE INFORMATION ON THIS CURTIS COST-SAVING EQUIPMENT . . . WRITE TODAY!

CURTIS PNEUMATIC MACHINERY DIVISION
of Curtis Manufacturing Company
1922 KIENLEN AVENUE • ST. LOUIS 20, MISSOURI

CM-837

OTHER CURTIS PRODUCTS: Automotive Lifts and High Pressure Car Washers; Commercial and Home Air Conditioning

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ZIRCON

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AND

FLOUR

For Foundry Practice—

- DOMESTIC & AUSTRALIAN ZIRCON FOUNDRY SANDS
- ZIRCON FOUNDRY FLOURS IN 200 AND 400 MESH PARTICLE SIZES

From Orefraction Inc., a large and leading American processor of Zircon ores.

Orefraction Inc.

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DELTA Core and Mold Washes

for

Closer Tolerance.. Better-Finish Castings

•

... Lower Cleaning Room Costs.....

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... Less Scrap...

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•

IMPORTANT REASONS WHY MORE FOUNDRIES USE DELTA CORE AND MOLD WASHES TO SPEED PRODUCTION AND REDUCE COSTS

DELTA CORE AND MOLD WASHES *"Anchor" themselves by penetrating from 4 to 7 grains deep into the sand.* This bond between the wash and the sand . . . an exclusive DELTA feature . . . produces an expansion-resisting coating essential to the production of finer finished castings.

The dry compression strength increases with each degree rise in temperature up to 500° F when the hot compression strength takes over. *The hot compression strength* increases with each degree of temperature rise up to 2900° F. The ultimate hot compression strength of the wash is over 1000 p.s.i.

There is no gas leakage through Delta Core and Mold washed surfaces. Gases produced by decomposition of organic binders in the core sand cannot leak through Delta Core and Mold washed surfaces to contact the molten metal. Only DELTA CORE AND MOLD WASHES provide this unique and all-important insurance against defective castings resulting from gas leakage.

DELTA

There is a DELTA Wash for every type of Metal Casting.

Working samples and complete literature on Delta Foundry Products will be sent to you on request for test purposes in your own foundry.

DELTA OIL PRODUCTS CO.

MANUFACTURERS OF SCIENTIFICALLY CONTROLLED FOUNDRY PRODUCTS

MILWAUKEE 9, WISCONSIN

REDUCES CORE STORAGE. Cores move *continuously* from sand ramming to molding. No need to store large quantities to tide over between runs, as with oven-baking. Special core runs can be made quickly.

SAVES SPACE FOR PLATES. Continuous flow of cores speeds up turnover of core plates. Fewer plates are needed and being of plywood, they are cheaper.

Thermex
ELECTRONIC CORE-BAKING EQUIPMENT

Ways you can cut costs with a Thermex CORE BAKER

THIS 60 KW THERMEX* Core Baking Unit reduced baking time, compared to old ovens, *from 16 hours to 30 minutes.* This equipment cuts costs many ways: It cuts scrap loss because of superior core quality; it saves manhours; it makes production flexible; and . . . as featured here . . . it saves floor space.

Find out how you can improve *your* core room efficiency with THERMEX Equipment. Mail the coupon for free booklet. The Girdler Company, Thermex Division, Louisville 1, Kentucky.

*THERMEX—Trade Mark Reg. U. S. Pat. Off.

UNIT IS COMPACT. Entire baking operation is concentrated in this small area. Cores enter THERMEX unit at left . . . exit at right in 30 minutes or less, thoroughly baked.

The
GIRDLER
Company

A DIVISION OF NATIONAL CYLINDER GAS COMPANY

THERMEX DIVISION

The Girdler Company, Thermex Division
224 East Broadway, Louisville 1, Kentucky

Please send me the new booklet on Electronic Core-Baking.

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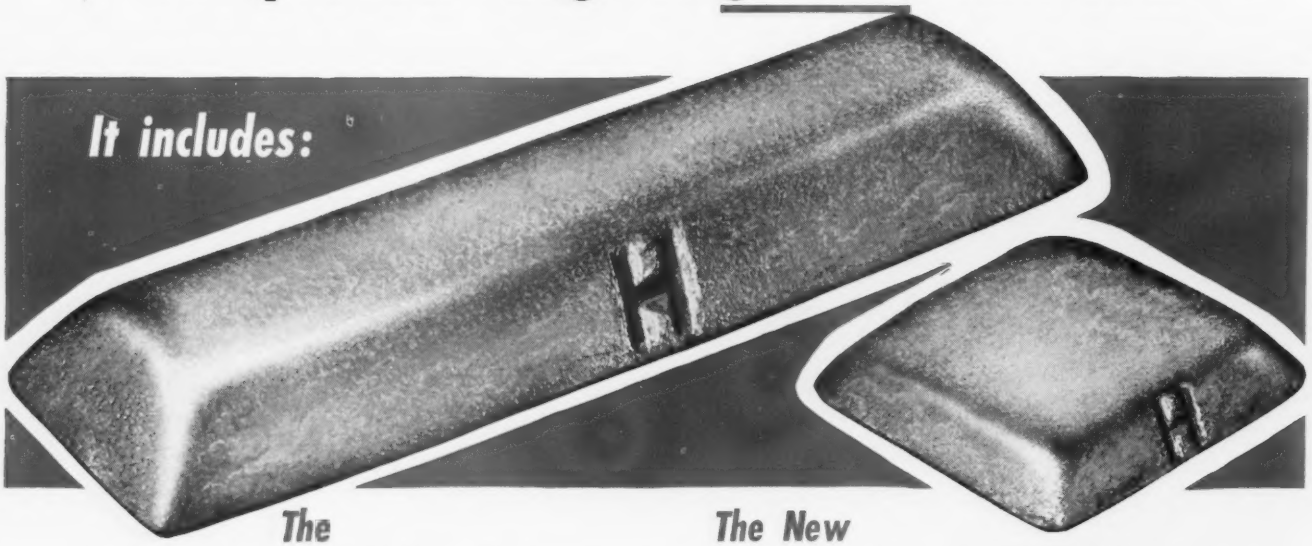
Now, more than ever, you can depend on

HANNA

as your best source for

PIG IRON

- *Our merchant capacity is bigger than ever*
- *Our plant is better than ever*
- *Our product range is greater than ever*



The

HANNA 38-POUND PIG

The foundryman's favorite standard pig. Available in all grades, silvery and HannaTite. A good example of the quality that has made Hanna "the best known name in iron."

The New

EXCLUSIVE HANNATEN INGOT

For 10-lb.-pig users, this new ingot means no free-carbon pockets, finer grain structure, more even melting. Available in all grades, silvery and HannaTite—an extra-close-grain iron.

THE HANNA FURNACE CORPORATION

Buffalo • Detroit • New York • Philadelphia

Merchant Pig Iron Division of

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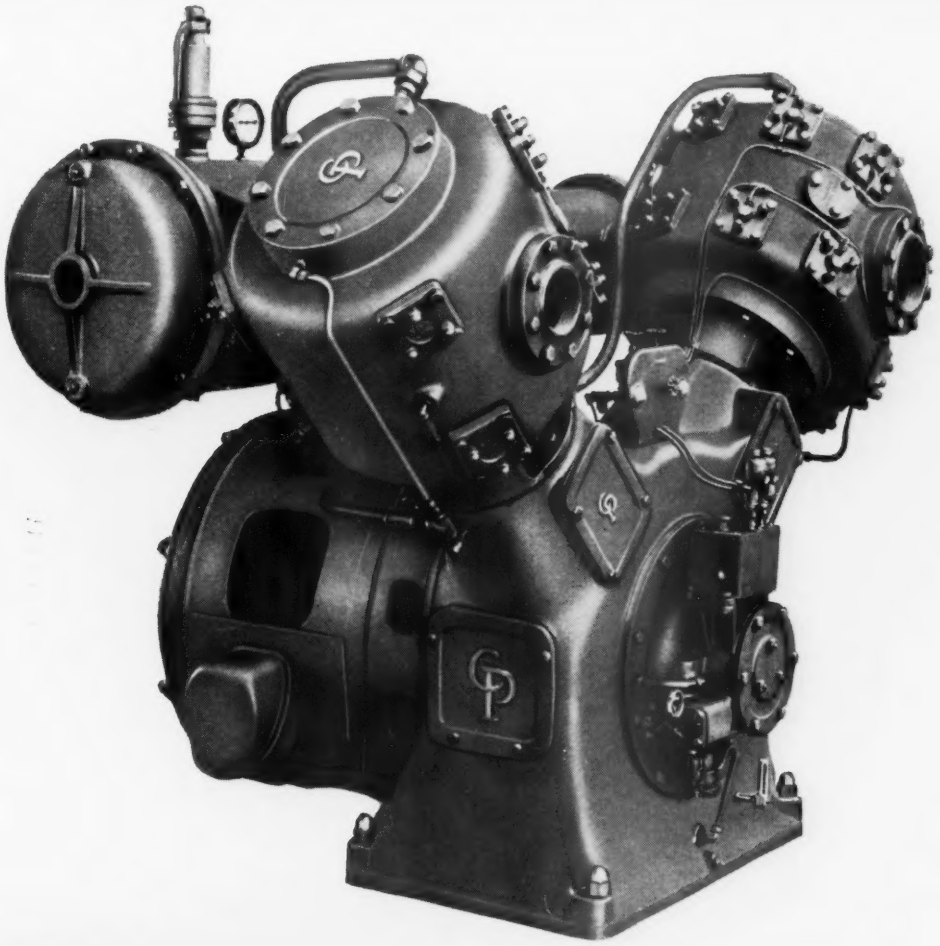


for the most in a Compressor

IN THE LEAST SPACE

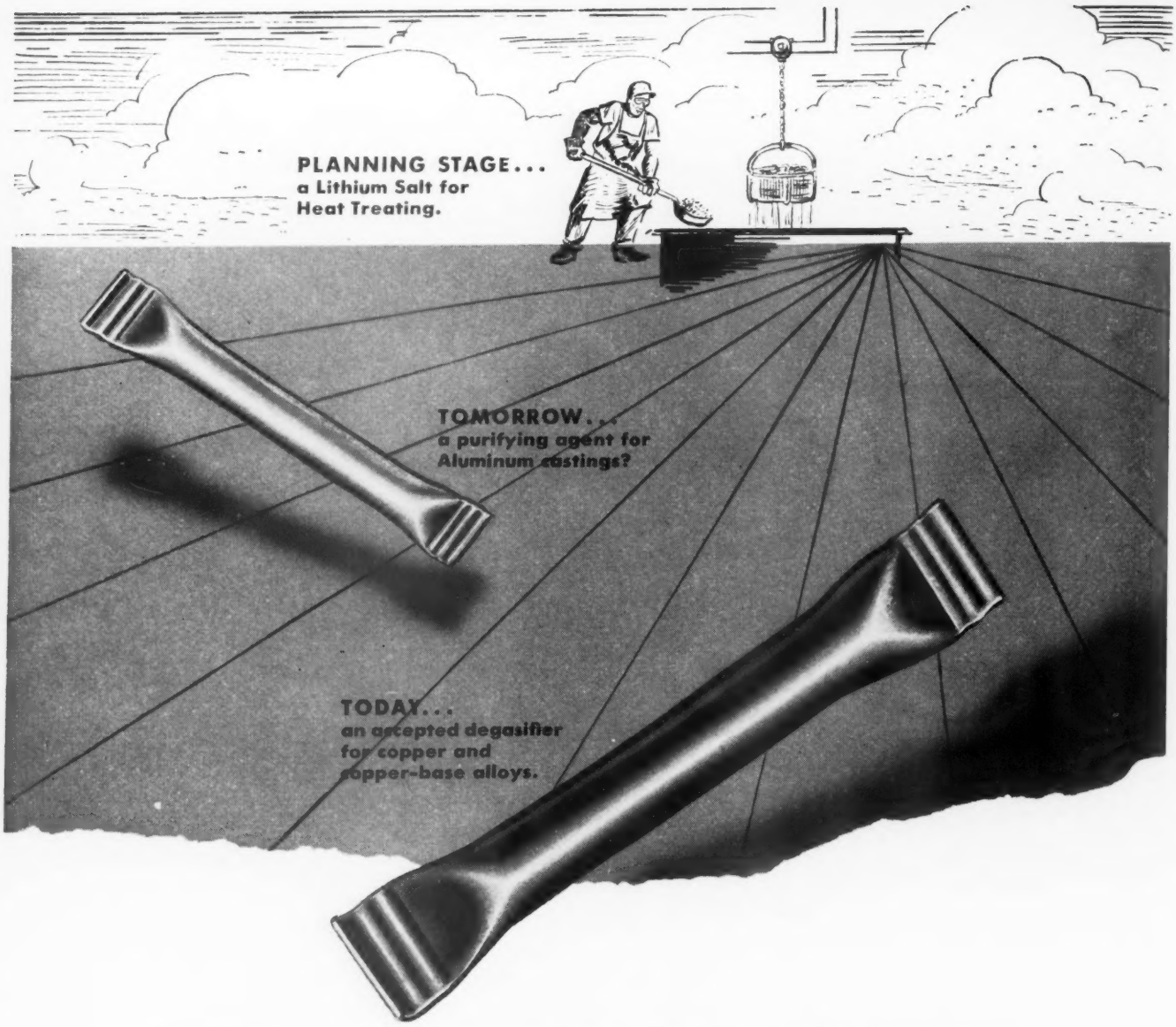
The Class "Y" compressor offers everything a good compressor should have for heavy duty service: high overall efficiency, long life with minimum maintenance; smooth, quiet operation, accessibility and simplicity, compactness and ease of installation. With one-piece frame, it is shipped intact, including a flange-mounted motor—truly a "package" type unit. Built in sizes 75 to 250 H.P., it is available in single and multi-stage designs for pressures up to 5000 pounds, with belted, coupled or flange-mounted motor drive.

Simplate Valves, efficient and easy-to-clean shell-and-tube intercooler, multistep capacity regulation, roller main and precision type connecting rod bearings are some of the reasons for the big compressor performance of these medium size machines.

Write for Bulletin 766

Chicago Pneumatic *8 East 44th Street, New York 17, N. Y.*

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES



LITHIUM METALLURGY

Lithium has been long established in the nonferrous foundry industry as a degasifier, deoxidizer, desulfurizer and general purifying agent. The small amounts required put both the economics and technique within the limits of everyday nonferrous foundry operation. Now, tests under certain production conditions indicate that Lithium is equally valuable as a degasifier for aluminum castings. Still in the realm of research, Lithium Salts hold vast promise of valuable benefits for low temperature heat treating baths. Why don't you look into this miracle element? This revolutionary technique is within *your* reach. Write for the details.

... trends ahead in industrial applications for Lithium

LITHIUM CORPORATION OF AMERICA, INC.
2600 RAND TOWER
MINNEAPOLIS 2, MINN.

MINES: Keystone, Custer, Hill City, South Dakota • Bessemer City, North Carolina • Cat Lake, Manitoba • Amos Area, Quebec • BRANCH SALES OFFICES: New York • Chicago
CHEMICAL PLANTS: St. Louis Park, Minnesota • Bessemer City, North Carolina • RESEARCH LABORATORY: St. Louis Park, Minnesota

ACCO products

The WRIGHT Hoist for the Job... Helps Build Production Profits

PURCHASE of WRIGHT Speedway Hoists means more than the cost **PRICE**. It means that you have the very best in plant lift equipment **PLUS** the longest-lived, hardest working hoists with a minimum of **MAINTENANCE** requirements. Production men find them more than the **EQUALS** of any hoists with their easy, smooth-running performance. Their **TOTAL** maintenance is so small and service so easy that "down time" **COST** is hardly considered in plants equipped with WRIGHT Speedway Hoists.

Write our York, Pa. office for any or all of these fully informative bulletins—
Bulletin DH-133B on Frame 1 and 1½ WRIGHT Speedways
Catalog E-54A on Frame 2 and 3 WRIGHT Speedways
Bulletin DH-504 on WRIGHT Electric Roller Chain Hoist

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Wright Hoist Division
AMERICAN CHAIN & CABLE

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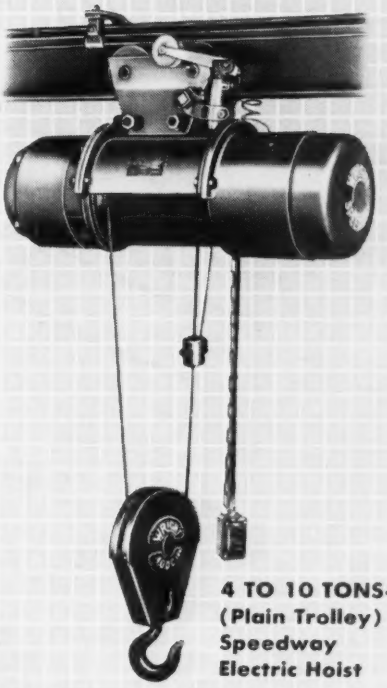
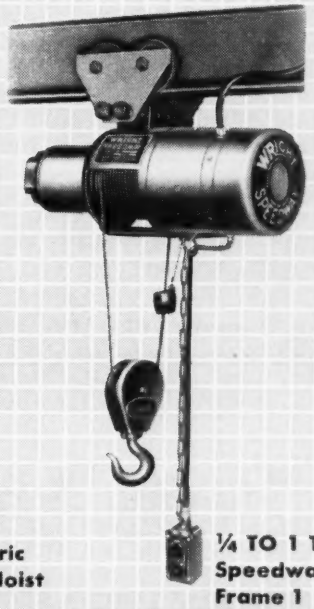
Hoists Trolleys Cranes

THE HOIST FOR THE JOB
(Frame 2 and 3)



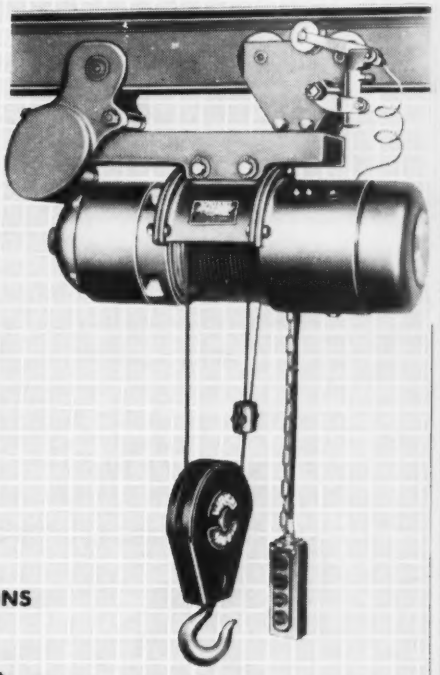
4 TO 10 TONS—
(Plain Trolley)
Speedway
Electric Hoist

¼ TO 2 TONS
WRIGHT Electric
Roller Chain Hoist



¼ TO 1 TON
Speedway
Frame 1
Electric Hoist

1½ TO 2 TONS
Speedway
Frame 1½
Electric Hoist



½ TO 6 TONS
(Motor Driven Trolley)
Speedway
Electric Hoist

Want dependable quality?

USERS of pig, ingot and billet can rely on Kaiser Aluminum for dependable quality because we are an integrated producer, controlling every step of production. Modern equipment, complete laboratory facilities and pride of workmanship assure you of a better product.

We produce pig, ingot and billet to all standard specifications or to special customer specifications.

Our outstanding engineering service includes design assistance and other technical advice. For prompt personal service, contact the Kaiser Aluminum sales office listed in your telephone directory.

Conveniently located plants at Newark, Ohio; New Orleans, Louisiana; Halethorpe, Maryland; Spokane and Tacoma, Washington.

Kaiser Aluminum & Chemical Sales, Inc. *General Sales Office,* Palmolive Bldg., Chicago 11, Illinois. *Executive Office,* Kaiser Bldg., Oakland 12, California.

Kaiser Aluminum

The nation's largest supplier of pig, ingot and billet

- *Speeds Curing — 10 times faster than conventional oven baking*
- *Affords 60% Fuel Savings*
- *Produces Smoother Finishes*

SIMPLIFIED OPERATION

"Tell-All" control panel, consisting of meters, lights, buttons grouped at eye level, enables operator to keep on top of the complete operation at all times—to maintain top level production with maximum speed and accuracy.

All the advantages of dielectric baking... *Plus*

EXACT QUALITY CONTROL

Adjustable electrode control permits correct compensation for physical variances in cores — eliminates burning or incomplete baking, even when cores have very thin or thick sections.

- *Frees Storage Area*
- *Eases Shakeout*
- *Improves Working Conditions — cleaner, cooler*

"LOAD MASTER" PROTECTION

Automatic grid control assures correct drive to the oscillator tube regardless of oven load. Automatic conveyor control prevents electrical overload by controlling the belt travel when load is too great for normal operation.

Get all the facts on the *Foundromatic* dielectric core oven. Call your nearby Allis-Chalmers district office, or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 15B7306B.

Foundromatic is an Allis-Chalmers trademark.

EXTRA SAFETY FEATURES

The *Foundromatic* core oven provides greater safety for operator and machine. Metal cabinet is designed to trap radiation. Door safety interlocks remove power when cabinet is opened for inspection.

A-4707

ALLIS-CHALMERS

IRON AND STEEL SHOPS SAVE WITH TRULINE®

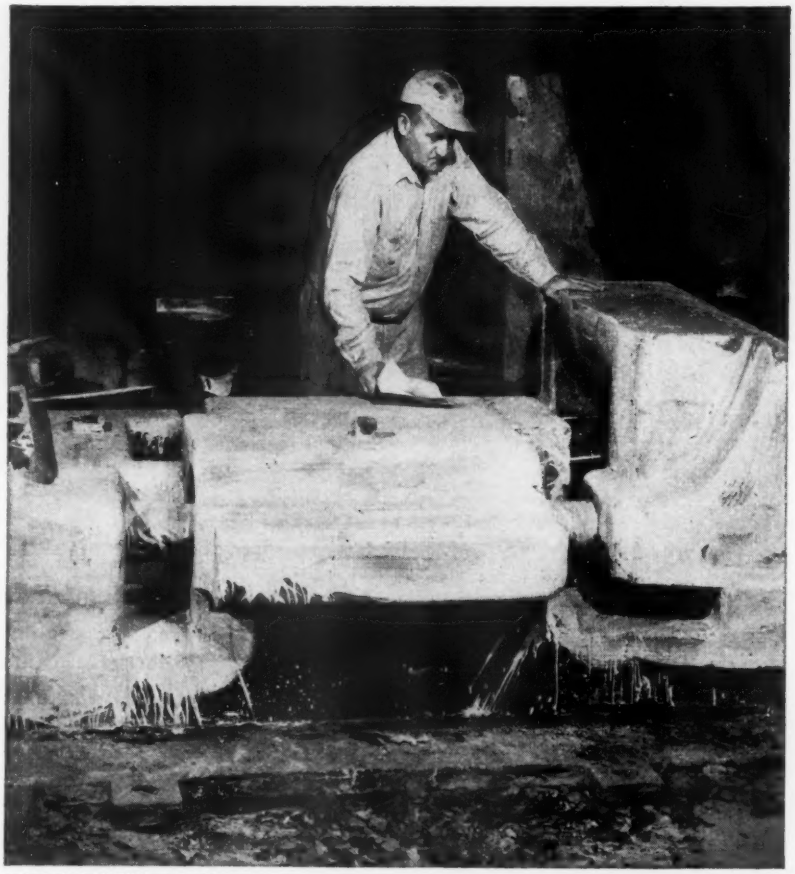
Today's accent on economy offers foundrymen convincing reasons why they should use Truline Binder in core sands. Savings in both man-hours and material costs are obtained in producing quality castings.

Iron shops using Truline for gravel and black sand cores report as high as 50 per cent reduction in shake-out and baking time. The high baked strength tends to eliminate core breakage. In some cases, iron foundries have successfully used Truline in a mixture of half heap sand with new, for medium and large core work.

Truline gives faster and more uniform baking—smoother, cleaner casting surfaces. Steel shops report its high efficiency in core facing sands, backing sands, and pouring cup mixes. Truline is equally effective for skin dry and dry sand molds. It has high resistance to moisture pickup.

Let us give you the up-to-date story on how Truline can help you save time and money.

BAKES OVERNIGHT—Iron shops solve baking bottlenecks by using Truline. This core was baked thoroughly in one night at 400°F.—halving the time required with other binders.



COLLAPSES QUICKLY—Truline helps prevent cracked castings, even where thickness of metal sections varies from one and one-half inches to eight, because cores collapse easier.

Naval Stores Department
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NF54-2

Here's How HYSTER® *PLANNED* MATERIALS HANDLING SAVES TIME AND MONEY in foundries

Here are typical examples of how Hyster Industrial Trucks are helping to make *tremendous* savings in materials handling costs in *foundries.*

Whether you are now using lift trucks, or haven't ever used industrial trucks of any kind, your Hyster Dealer is ready to help you achieve cost reductions. Because he keeps abreast of the materials handling problems and improvements, he has helped many foundries realize more profit from their operations. *Why not call him today* and take advantage *of his specialized services? Materials Handling Trucks from 1,000 to 30,000 pound capacities.*

HYSTER XA-60 LIFT TRUCK maneuvers steep ramp from ground level to loading dock carrying a load of 10" soil pipe sections 53" long. A southern foundry operation.

HYSTER DEALERS GIVE YOU ALL 3

1. PLANNING. Your Hyster Dealer will plan your materials handling operation from scratch — or will analyze your present system to see if it can be improved.

2. THE RIGHT TRUCK for *your* job from Hyster's complete line of industrial trucks (1,000-30,000 lbs) and over 100 job-attachments.

3. THE RIGHT SERVICE—ample spare parts stock, shop facilities, factory-trained mechanics and an efficient field service that keep your Hyster lift trucks going on your job, wherever your job might be located. Hyster trucks are noted the world over for their low downtime.

HIGHLY MANEUVERABLE HYSTER QN-20 with scoop dumping sand at molders bench. Also used to move castings, molds and other materials inside and outside.

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FOUR FACTORIES: Portland, Oregon; Danville, Illinois; Peoria, Illinois; Nijmegen, The Netherlands.

By the thousands Sterling flasks "make good"

This large malleable foundry has repeatedly ordered Sterling LS Flasks, some of which are shown in this picture.

uniform dependability wins "repeats"

Foundries requiring thousands of flasks repeat consistently on Sterling Steel Foundry Flasks. The reasons are plain: Sterling Rolled Steel Channel Flasks retain their accuracy and last longer because their all-steel, all-welded construction makes each flask virtually one solid, rigid unit, capable of withstanding tremendous pressures. Full width bearing with accurately planed surfaces to .005″ precision or better . . . plus the solid center rib and angle reinforcement . . . provide rugged defiance to the beatings a flask must take in everyday foundry service. It's because Sterling Flasks "make good" that foundries repeat year after year . . . on flasks of all types and sizes.

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Train Them Right

Increasing numbers of young engineers are finding opportunities in the field of castings production. This results from the changing character of foundry operations and the great pioneering job of the Foundry Educational Foundation.

But if these men are to master quickly manufacturing details, and if the individual company is to derive maximum benefit from these potential members of the management team, one thing is necessary. Foundry management must see that the training program in the plant is carefully developed and intelligently administered.

The graduate engineer of the future probably will have less background in vocational skills and processes, and more training in the basic sciences. He will have more studies in mathematics, physics, chemistry, metallurgy, mechanics, electrical theory and perhaps more attention to the arts and humanities. The habits, customs, and developed skills of the industry must be learned after he enters the foundry.

More than a formalized training program is involved in the development of the foundry engineer. What then are some of the factors that should be given consideration by management? A number of interesting suggestions along that line were made by Fred J. Walls, International Nickel Co., Detroit, in the Charles Edgar Hoyt Memorial Lecture presented at the Houston convention of the American Foundrymen's Society.

Mr. Walls suggests that you give the young man an opportunity to make his own mistakes, rather than teach him to repeat yours, for his may be less damaging than yours and may lead to greater developments and improvements than you expected.

Make sure the young man has as many contacts as possible with the key men in the organization so that they may obtain an over-all picture of his technical knowledge and his ability to apply and share his knowledge with his associates, as well as to learn from them.

Undertake a diplomatic job of bringing about the proper attitude on the part of supervision down the line, so that the young man will want to stay with the organization.

Encourage the young engineer as well as all supervision to join the AFS and to attend local meetings regularly.

Develop a foundry library that will be of great benefit to the young engineer as well as many others seeking greater knowledge of foundry operations.

As Mr. Walls concludes, foundries of the future may be quite different from those in operation today. Progress toward a greater industry providing better service to the nation, both in war and in peace, may depend on the engineers now entering the industry.

Let's do everything possible to develop this important potential for progress.

Frank G. Steinebach

Editor

BRUCE L. SIMPSON
President

FRANK W. SHIPLEY
Vice President

Technical Discussions

AFS

IT WAS strictly business for most foundrymen attending the 59th annual convention of the American Foundrymen's Society at Houston, Tex., May 23-27. Although total registration of less than 1500 was below the average of recent non-exhibit conventions, audiences at the various technical sessions were large—and comfortable, thanks to Houston's famed air-conditioning facilities.

A wealth of information on modern casting practices was made available in the approximately 65 technical sessions, shop course sessions and luncheon and dinner meetings held during the week. High spots of the technical program included the Sand Division dinner meeting, reports on AFS research projects, and a symposium on nondestructive testing. Other convention features were the society's annual business meeting, the Charles Edgar Hoyt Memorial Lecture and the annual banquet.

Texas Chapter was a busy host in providing arrangements for an ususually extensive entertainment program for visiting ladies, as well as for visits to local plants and for the Texas Chapter Night barbecue party.

Business Meeting—AFS President Frank J. Dost, Sterling Foundry Co., Wellington, O., presided at the annual business meeting. In reviewing the past year's activities he referred to the work of the various technical committees, to the fundamental research being sponsored by the society and to a number of new technical publications issued recently or about to be published. The latter include the revised *Cast Metals Handbook* and a new college textbook, both due out this fall.

Mr. Dost said that scholarships to be made available through the $50,000 Pangborn grant for educational purposes will be announced this fall. They

Registration headquarters at the Rice Hotel, Houston

Highlight

CONVENTION

Houston meeting attracts large and interested audiences to technical sessions. Subjects relating to sand, nondestructive testing and research feature program at first national convention in the Southwest

are to be awarded through the chapters.

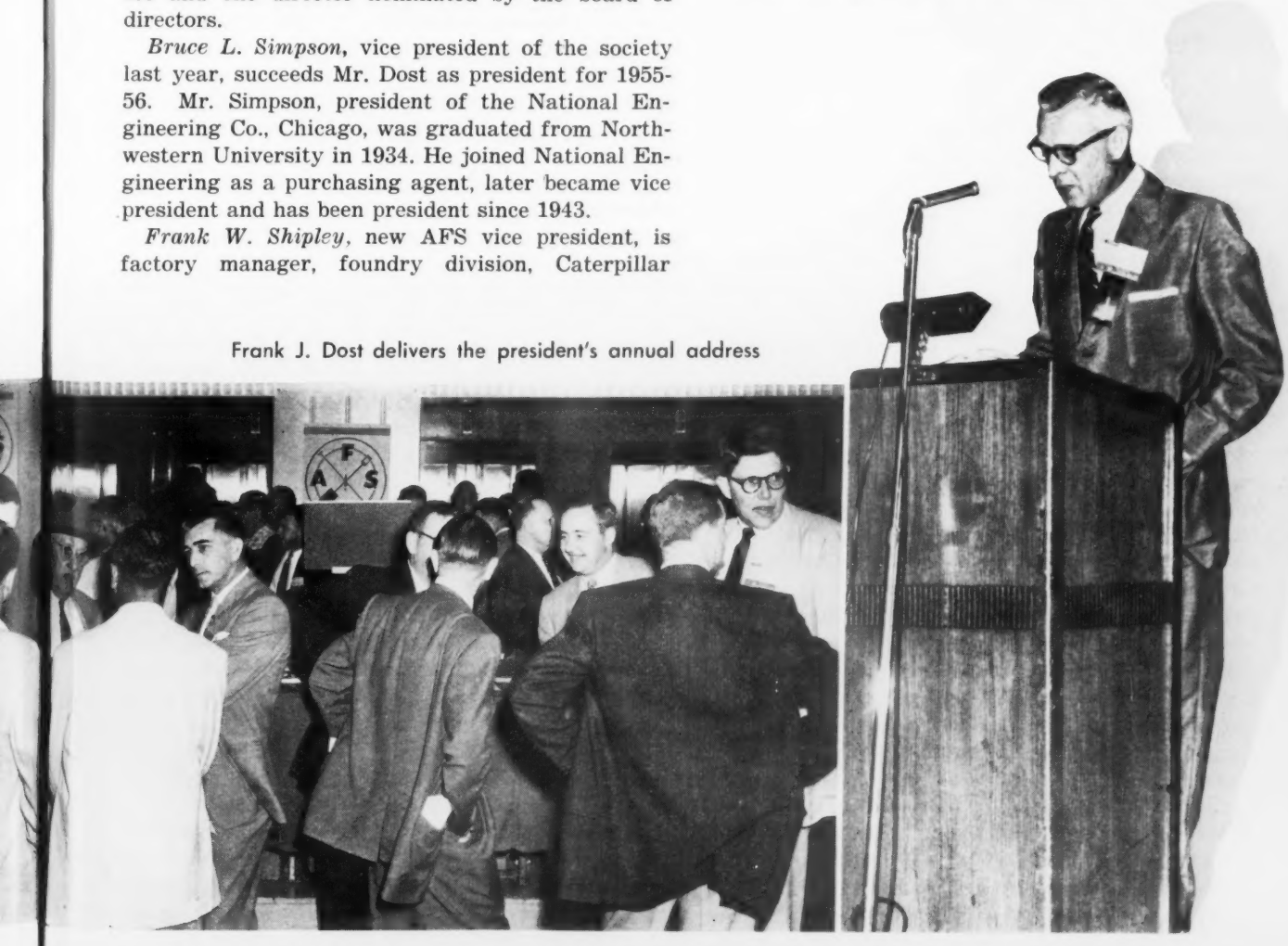
Among the year's other accomplishments were the completion of the national headquarters building at Des Plaines, Ill., the inauguration of castings clinics for chapter presentation and the holding of seven regional meetings in which 22 chapters participated.

Officers and Directors — William W. Maloney, general manager, announced the election of officers and directors selected by the nominating committee and one director nominated by the board of directors.

Bruce L. Simpson, vice president of the society last year, succeeds Mr. Dost as president for 1955-56. Mr. Simpson, president of the National Engineering Co., Chicago, was graduated from Northwestern University in 1934. He joined National Engineering as a purchasing agent, later became vice president and has been president since 1943.

Frank W. Shipley, new AFS vice president, is factory manager, foundry division, Caterpillar Tractor Co., Peoria, Ill. Graduated from Purdue University in 1921, Mr. Shipley was with the Studebaker Corp., South Bend, Ind., for four years. Later he served the Lakey Foundry & Machine Co., Muskegon, Mich., and Fairbanks, Morse & Co., Beloit, Wis. Joining Caterpillar in 1929, Mr. Shipley has headed its foundry division since 1944. He is a past chairman of the Central Illinois Chapter and a past national director of AFS.

Frank J. Dost, who as retiring president be-



Frank J. Dost delivers the president's annual address

Above—William W. Maloney, general manager, speaking at the annual AFS business meeting

Left—Fred J. Walls, the International Nickel Co., delivering the Charles Edgar Hoyt Memorial Lecture—"Education and Future Foundrymen"

comes a director for one year, is joined on the board by the following new directors elected to three-year terms:

Curtis C. Drake, plant superintendent, Denver plant of Griffin Wheel Co., and sales representative for the company in the Rocky Mountain area. Mr. Drake has been with the company for 38 years. He is a charter member and past chairman of local chapters of both AFS and ASM and immediate past president of the Colorado Engineering Council.

Harold C. Erskine, assistant general manager, Aluminum Co. of America's castings division, Pittsburgh. Since February he has been on loan by the company to the government as director of the Aluminum and Magnesium Division, Business and Defense Services Administration, Washington. Mr. Erskine joined Alcoa following World War I servvice. In 1940 he was named manager of the Fairfield, Conn., works and three years later became works manager at Cleveland. In 1952 he became assistant manager of the company's die casting division at Garwood, N. J. Combining of that division with the castings division last year returned him to Pittsburgh as assistant general manager of the latter.

C. W. Gilchrist, foundry superintendent, Cooper-Bessemer Corp., Mount Vernon, O. Mr. Gilchrist joined the company's Grove City, Pa., plant following graduation from Tri-State College in 1939; later he was transferred to Mount Vernon. After five years with the Air Force he returned to Cooper-Bessemer in 1946 as foundry engineer, and in 1948 was made assistant foundry superintendent. He has been superintendent since 1949. Mr. Gilchrist is a past chairman of the Central Ohio Chapter.

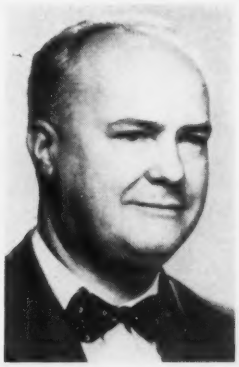
O. Jay Myers, technical director, Archer-Daniels-Midland Co.'s Foundry Products Division, Minneapolis. Graduated from Princeton University in 1937, he later received advanced degrees from Colorado School of Mines. In 1942 Mr. Myers joined Wright Aeronautical Corp., Lockland, O., where he was director of foundry practice before joining Archer-Daniels-Midland Co. in 1945 in his present capacity. He is a past chairman of the Twin City Chapter and the newly elected chairman of the AFS Sand Division.

Charles E. Nelson, technical director, Magnesium Division, Dow Chemical Co., Dow City, Mich. Mr. Nelson was graduated from Alma College, and before joining Dow in 1930 was associated with the Chevrolet and Dupont companies. Starting as a research metallurgist at Dow, Mr. Nelson became chief of the metallurgical staff in 1937, assistant director of metallurgical research in 1941 and technical director of the Magnesium Division in 1946.

Richard A. Oster, director, Beloit Vocational and Adult School, Beloit, Wis. He has been with the school since 1945 and its director since 1950. Graduated from Stout Institute, Mr. Oster did graduate work at the University of Wisconsin. Before going to Beloit he was with Compressed Industrial Gases Inc., Milwaukee, National Cylinder Gases Inc., Chicago, and West Allis Vocational and Adult School. He also has served in industry as a consultant.

Robert W. Trimble, foundry superintendent, Bethlehem Supply Co., Tulsa, Okla. Mr. Trimble attended Kansas University. He was engaged in various supervisory positions and as foundry super-

New Directors

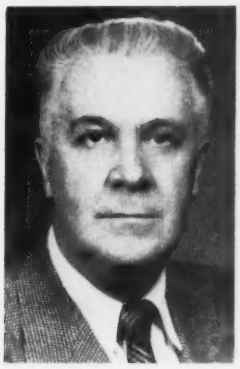


CHARLES E. NELSON

ROBERT W. TRIMBLE

C. W. GILCHRIST

HAROLD C. ERSKINE



CURTIS C. DRAKE

O. JAY MYERS

RICHARD A. OSTER

intendent prior to 1937 when he joined the International Supply Co., Tulsa, in the latter capacity. This company was purchased by Bethlehem Steel Co. about a year later. He has continued as foundry superintendent since then and also supervises the Bethlehem foundry at Corsicana, Tex. Mr. Trimble is a past chairman and one of the organizers of the AFS Mo-Kan Chapter.

Apprentice Contest—Prior to the awarding of prizes in the national AFS apprentice contest at the annual meeting, William J. Hebard, Continental Foundry & Machine Co., East Chicago, Ind., chairman of the Education Division, spoke briefly on the division's activities, which include the apprentice competition.

Mr. Maloney announced the 1955 contest drew a record 365 entries representing 127 companies. Local contests were conducted by 14 chapters and 21 plants. First, second and third-place winners, respectively, in the various divisions were:

Wood Pattern: Eugene Boll, Central Pattern Co., St. Louis; Vincent J. Vineziano, Model Pattern Co., Cleveland; Dave Sullivan, Pacific Car & Foundry Co., Renton, Wash.

Metal Pattern: William J. Cook, Caterpillar Tractor Co., Peoria, Ill.; Ernest L. Slate, Annex Pattern Co., Detroit; Stanley Stobierski, Cove Pattern Works Inc., Cleveland.

Gray Iron Molding: Frederick S. Moran, Caterpillar Tractor Co., Peoria, Ill.; Stanley R. Varr, Brown & Sharpe Mfg. Co., Providence, R.I.; Harold Saunders, John T. Hepburn Ltd., Toronto, Ont.

Steel Molding: Richard T. Bernier, Maynard Electric Steel Castings Co., Milwaukee; Albert Meier, Atlas Foundry & Machine Co., Tacoma, Wash.; Joseph J. Zohil, Dodge Steel Co., Philadelphia.

Nonferrous Molding: Chester Boerama, Noren Pattern & Mfg. Co., Fruitport, Mich.; Oswald Keller, Nordberg Mfg. Co., Milwaukee; Donald Tetzlaff, Allis-Chalmers Mfg. Co., Milwaukee.

New officers elected by the various AFS divisions were announced by Mr. Dost as follows: *Brass and Bronze*—Chairman, Harry C. Ahl Jr., National Bearing Division, American Brake Shoe Co., Meadville, Pa.; vice chairman, Roger J. Keeley, Ajax Metal Division, H. Kramer & Co., Philadelphia. *Education*—Chairman, W. H. Ruten, Polytechnic Institute of Brooklyn, Brooklyn, N. Y.; vice chairman, B. L. Bevis, Caterpillar Tractor Co., Peoria, Ill.

Gray Iron—Chairman, Charles K. Donoho, American Cast Iron Pipe Co., Birmingham; vice chairman, F. T. McGuire, Deere & Co., Moline, Ill.; *Light Metals*—Chairman, E. V. Blackmun, Aluminum Co of America, Pittsburgh; vice chairman, Donald L. LaVelle, American Smelting & Refining Co., South Plainfield, N. J.; *Malleable*—Chairman, F. B. Rote, Albion Malleable Iron Co., Albion, Mich.; vice chairman, Eric Welander, John Deere Malleable Works,

Above—President Dost presents prizes to first-place winners in AFS national apprentice contest. Left to right, they are Richard T. Bernier, Frederick S. Moran, Chester Boerama, Eugene Boll and William J. Cook. *Right*—Group at Brass and Bronze Division luncheon meeting at Houston includes, left to right, H. C. Ahl Jr., William A. Meissner, B. A. Miller, B. N. Ames

Speakers table at the well attended dinner meeting of the Sand Division

East Moline, Ill.; *Sand*—Chairman, O. Jay Myers, Archer-Daniels-Midland Co., Minneapolis; vice chairman, Elmer C. Zirzow, Werner G. Smith Inc., Cleveland; *Steel*—Chairman, V. E. Zang, Unitcast Corp., Toledo, O.; vice chairman, James H. Lowe, Mid-Continent Steel Casting Corp., Shreveport, La.

Hoyt Lecture—"The future of the foundry industry lies in the human resources available to us. It is for our own benefit that we should assume a greater interest in the development of these resources," This theme was developed by Fred J. Walls, International Nickel Co. Inc., Detroit, in his Charles Edgar Hoyt Memorial Lecture. The lecture, entitled "Education and Future Foundrymen," was delivered after the annual business meeting.

"In this age of increasing mechanical and technical complexity," he continued, "the highly developed skills and technical knowledge are at a premium. Let us approach the means of laying the foundations of education from which can be assembled enthusiastic and trained people having a capacity to maintain and improve the relative position of the foundry industry among the more glamorous industries that have a natural attraction for educated youth."

Mr. Walls said that we must stimulate a demand for foundry instruction in the lower and high school grades if we are to expect a continuation and expansion of the science of casting in engineering colleges. He pointed out that the Foundry Educational Foundation is doing a "magnificent job" in 14 schools. Requests for other colleges for the foundation's co-operation are far in excess of its ability to finance. Its success and operation have been watched and partially copied by other industries, "and yet it is not fully appreciated nor properly supported by the industry which it is directly benefiting."

After citing many of the recent foundry technical improvements and those likely to develop in coming years, Mr. Walls concluded by saying that "future foundrymen will be somewhat different in that they will have at their command new technological developments. Of necessity they must have education in the sciences governing these developments. Nevertheless, in this transformation from an art to a science, we must still look upon skill and science as a happy union and avoid some of the attempts to divorce them completely. There is danger ahead if we drift too far in one direction, for no gear or even an electronic gadget has yet been developed that can be substituted for brains when something goes wrong."

Annual Banquet—The Shamrock Hotel's Emerald Room provided an attractive setting Wednesday evening for the AFS annual banquet. President Frank J. Dost presided. Acting for the AFS Board of Awards, Fred J. Walls presented honorary life memberships and gold medals to six individuals for outstanding contributions to the society and foundry industry. Life membership recipients were: Albert F. Pfeiffer, Allis-Chalmers Mfg. Co., Milwaukee; Frank C. Riecks, Ford Motor Co., Dearborn, Mich.; Frank J. Dost, Sterling Foundry Co., Wellington, O.

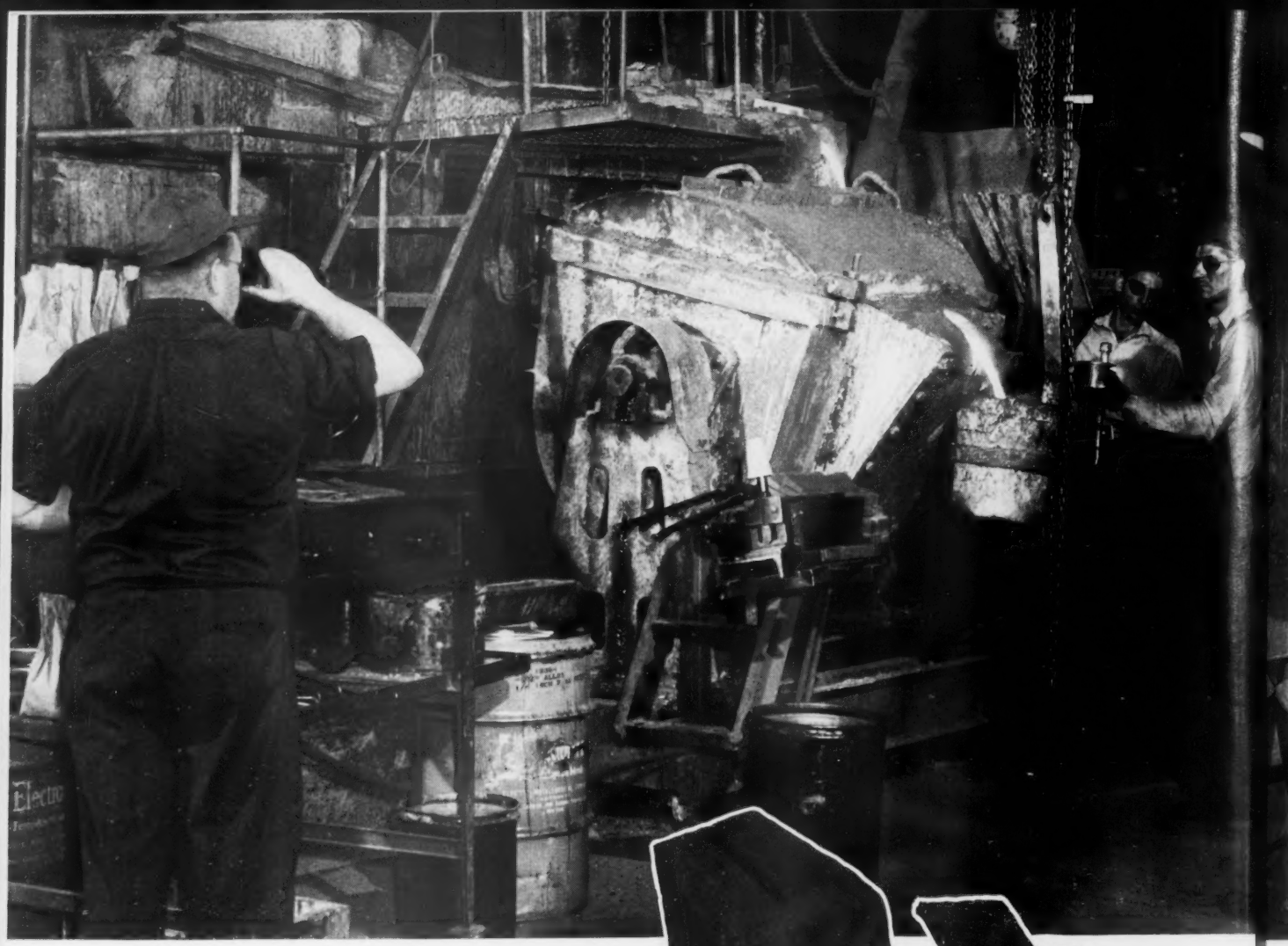
Medalists were: John B. Caine, foundry consultant, Cincinnati, the John H. Whiting Gold Medal; John E. Rehder, Canada Iron Foundries Ltd., Montreal, the Peter L. Simpson Gold Medal; Robert F. Thomson, General Motors Corp., Detroit, the John A. Penton Gold Medal.

Guest speaker of the evening was Hugh Comer, chairman, Avondale Mills, Sylacauga, Ala. Mr. Comer discussed in an interesting and highly entertaining manner the economic development of the South and Southwest.

A large number of past officers, directors, medalists and life members attended the annual AFS Alumni Group dinner. The program featured a fine address by Cal C. Chambers, president, Texas Foundries Inc., Lufkin. An abstract of the talk, entitled, 'Human Relations in the Foundry Industry," starts on page 122 of this issue. Tribute was paid to the memory of the late Charles E. Hoyt, AFS executive who for many years was secretary of the Alumni Group. By unanimous vote, Robert E. Kennedy, secretary emeritus of AFS, was named secretary of the Alumni Group. Bob was busy during the convention registering 25 and 50-year veterans at registration headquarters in the Rice Hotel.

Reports on various technical sessions held during the Houston convention start on page 201.

Malleable Division held its roundtable luncheon on the opening day



Molten metal temperature is checked continuously through pyrometer readings taken every ten minutes

Test bars and slugs (right) are poured into a small sand core and chilled by water piped through mold

Spinning Cylinder Sleeves

at Perfect Circle

A search for a less expensive method to produce better piston rings led Perfect Circle Corp. engineers to develop a new technique for centrifugally casting cylinder sleeves, creating a new product for the company

By KENNETH L. MOUNTAIN
Assistant Editor

Cupola charges of about 1500 lb are weighed and loaded by hand into front-drop dump box

Granular inoculants are added to each transfer ladle before pouring into the measuring ladles

AS A COMPLEMENT to its industrial giants, the American industrial scene is generously sprinkled with small and medium-sized plants that have a proven record of production efficiency. Typical of these is the Perfect Circle Corp., operating factories in Hagerstown, Tipton and Richmond, Ind., and foundries in New Castle, Ind., Richmond, Ind., and Muskegon, Mich.

Organized in 1895 as the Railway Cycle Mfg. Co., and producing a small railroad inspection car, the company changed its name several times, generally to coincide more closely with the products being manufactured. In 1903, a complete motor for the inspection car was being made. In 1907, the company entered the piston ring field as a supplier to other engine manufacturers, and has remained so until today. Its present name was adopted in 1926.

During this period of growth there has been an evident awareness at Perfect Circle that product acceptance can be reached, maintained and held only by the manufacture of a product with built-in quality. The never-ending research and development work so vital to maintaining this objective at Perfect Circle opened the way, quite by accident, for a new process of centrifugally casting gray iron. And therein lies the story of the Perfect Circle Sleeve Castings Plant at Richmond, Ind.

Prior to World War II, Perfect Circle engineers embarked on a project to find improved but less expensive methods to produce better piston rings. The project was interrupted during the war years but resumed at the end of hostilities. Centrifugal casting as a process was studied. Equipment in use at other companies was observed in operation. Literature on the subject, of which there was little, was scanned for any hints that might prove useful. After considerable research, study and experimentation, the engineers incorporated their findings into a new centrifugal casting machine that did turn out castings from which piston ring blanks could be sliced.

Analysis of these early castings indicated that the inherent nature of the spinning process made it a natural for production of cylinder sleeve castings, because the ID appeared to have a better wearing surface than the OD.

Slow Cooling a Problem—But there were many problems to solve, the most difficult of which was how to cool the casting slowly enough within a given spinning cycle to obtain the desired long wearing surface. The answer to this tough prob-

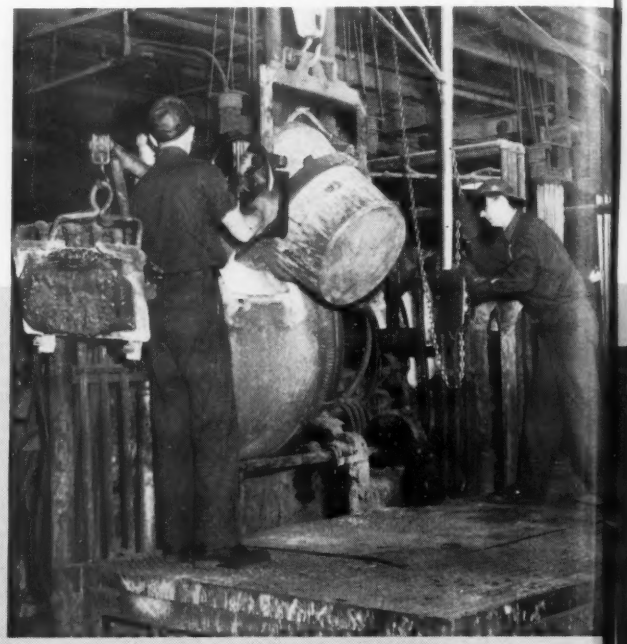
lem lay in the composition of the ceramic coating sprayed on the mold. It evolved from experiments starting in 1946 with a single spinner and a single electric furnace. Diligence, skill, patience and stick-to-it-iveness proved that the use of hot mold and a now-patented mold coating was the secret to control of a cooling rate necessary to provide the desired metal qualities and finish.

By July, 1948 two spinners and two electric furnaces were being used in the pilot operation. By December, 1949 the operation was enlarged and one cupola, two electric furnaces and 13 spinning machines were in production. During the Korean crisis in 1950 two full shifts, two cupolas and three electric furnaces were operating. Three years later 22 spinners were working. The experiment had survived its growing pains and expanded into a going business that included full production, warehousing, shipping, maintenance, stockroom and office facilities in a sheet metal and concrete block building of about 44,000 sq ft in area.

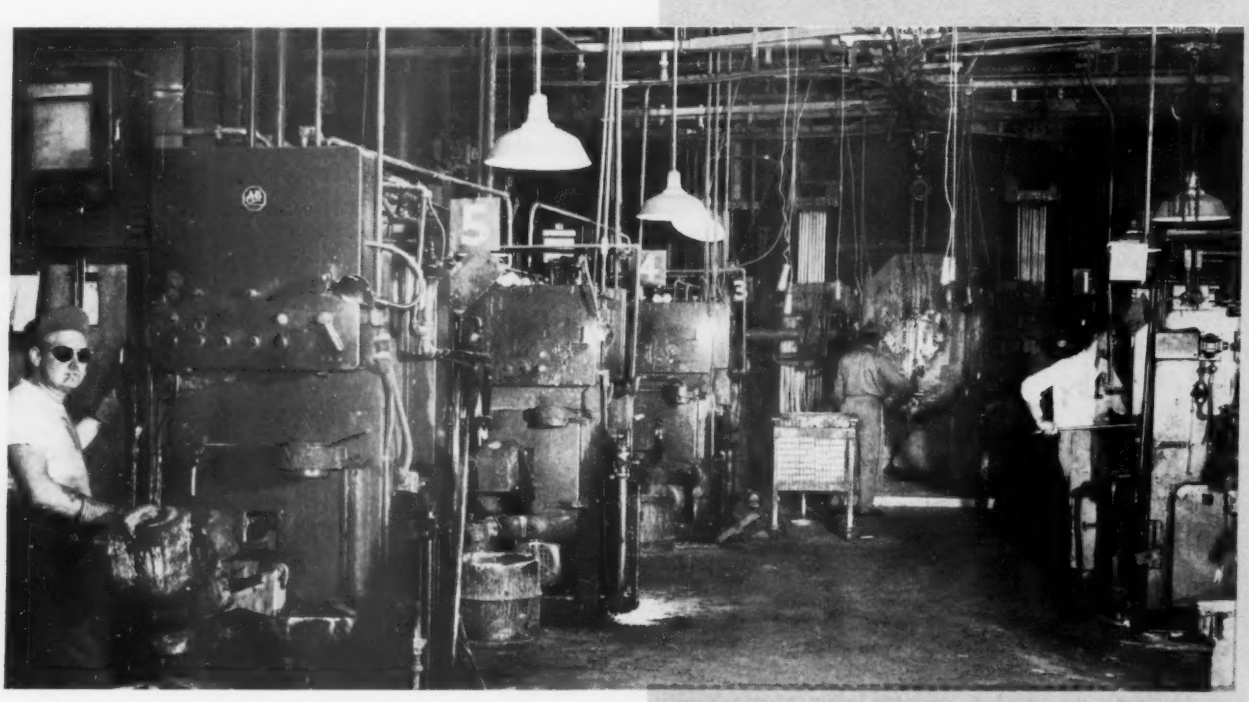
Metal for the batteries of spinning machines is supplied from two basic-lined, continuous front tap, rear slagging cupolas. Slag is tapped into a water trough, cooled, and removed to an outside dump area. Three electric furnaces of 1500 lb capacity each are used in conjunction with the cupolas. Where special alloys are required or where iron of different analysis from the base cupola metal is desired, it is melted in the electric furnaces. The electric furnaces also offer additional flexibility as holding units or as melting units during experimental and development work.

Present production requires that 50 tons of metal be melted daily. To meet this demand, each cupola charge is about 1500 lb, weighed and loaded by hand at ground level into a front-drop dump box, elevated by a skip hoist and dropped into the cupola. Components of the charge are loaded into storage bins at the weigh station from an adjacent outside storage yard.

Cupola Charge—A high-strength charge currently being melted and containing 3.10-3.25 per cent carbon consists of the following: Steel scrap 540 lb, Si pigs 340 lb, remelt 620 lb, Mn briquets 3 lb, Cr briquets 3.5 lb, Cu shot 4 lb and Ni-Cu shot 2 lb. A charge of this composition has a tensile strength of 40,000 psi in the finished castings.



When special irons are required, cupola iron is poured into electric holding furnaces where proper alloys are added



One of three banks of specially designed centrifugal casting machines. These machines receive molten metal from the electric furnace seen in the background

A general all-purpose analysis covering a full range of cylinders produced would include these percentages: TC 2.90-3.50, Si 1.80-2.50, S 0.12 max, P 0.10-0.30, Mn 0.50-0.80, Cr 0..20-0.80, Cu and/or Ni 0.25-1.00 (can be used interchangeably). Such a composition would brinell from 212-293 under a 3000-kg load and have a minimum tensile strength of 35,000 psi on 0.250-0.350 in. walls and 30,000 psi on walls over 0.350-in. thick.

Metal at about 2800° F is taken from the cupola or electric furnaces in transfer ladles containing just enough metal to fill the measuring ladles on each of four spinning machines. Every transfer ladle receives its proper additives in granular form. Ferrosilicon, ferromolybdenum, ferrochromium, carbon, titanium and phosphorus are added singly or in combination depending upon the specifications of the particular cylinder to be cast.

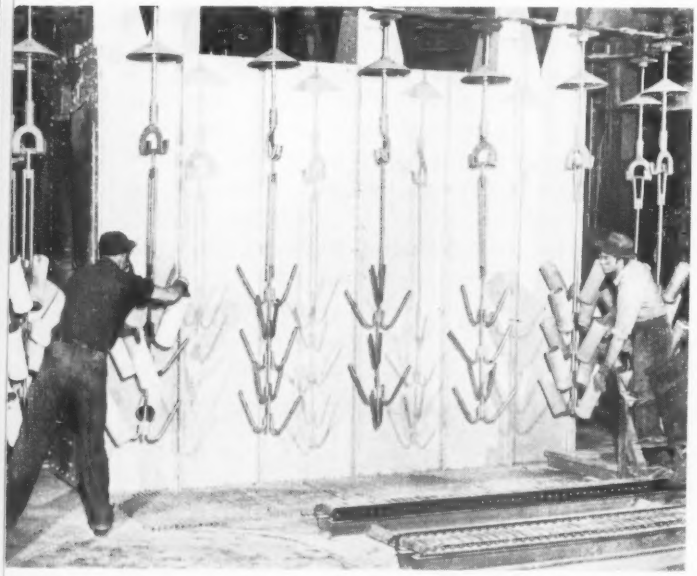
Height of the cupola and electric furnace spouts is fixed so that the pourer does not have to adjust the height of his transfer ladle as he fills it with metal. The transfer ladle remains at a constant level as it moves on overhead rails to the measuring ladles of the spinning machines. The measuring ladle on each spinner in designed to hold the exact amount of metal required to make the particular size of cylinder the machine is casting.

Each spinning machine is an automatic production unit in itself. All are basically the same with minor differences necessary to compensate for the variations in size of cylinders being cast. Tubular-shaped dies or permanent molds are of cast iron and are machined to finish in the company's machine shops. Each machine holds five or seven molds. Each mold is kept in the machine under radiation tubes at a temperature of 700-900° F.

Coating Sprayed Automatically—At the start of the casting cycle a mold automatically moves

Pouring measured molten metal into spinning mold revolving at a speed creating a force on the inside surface of casting that is 120 times the force of gravity

into the casting chamber and is rotated constantly at 1000 to 3000 rpm. This speed is sufficient to squeeze gas and nonmetallic impurities out of the molten metal. The patented mold coating is sprayed automatically to a predetermined thickness inside the spinning mold. The mold coating formula is prepared in a centralized location and forced by compressed air through 1½-in. ID tubing to each spinning unit.



To avoid damage during cleaning, each casting is individually racked on hooks before moving into nearby continuous steel shot blast cabinet

The mold coating is a mixture of silica flour, bentonite, water and a wetting agent. The foaming action of the wetting agent in suspension with the other ingredients combines to slow the cooling rate, provides a desirable surface finish, and permits smooth ejection of cylinder from the mold.

After the mold is sprayed, metal at about 2600° F is introduced into the spinning mold from the measuring ladle via a chute and runs into the mold by gravity. Metal temperature at this point is a critical part of the operation. If metal is above 2600° it is too hot and will not cool sufficiently within the allotted spinning time. If the metal is below 2500° it is too cold and will spall on the chute. The mold spins for a definite preset cycle, depending upon the size of cylinder being cast. Upon completion of the spinning cycle, the mold and casting are elevated to an upper level in the machine where it cools while moving to the ejector station at the opposite end of the machine.

The operator removes the casting from the mold with a tilting device, and the cylinder slides down a chute to a weight scale. Upon extraction, the casting temperature is between 1600-1800°. The casting gets a weight check on the scale. If casting is within prescribed limits and appears sound otherwise, its ID is probably acceptable. If the casting is underweight it is rejected at this point as scrap. Any scale or surface dirt on the inside of the mold is scraped away before the mold is rolled back in the holding chamber. In due time the mold reaches the spinning chamber again and

Control Checks Assure High Quality

Mold coating is rigidly controlled by carefully checking given volume of patented liquid mixture

Dimensional control is aided by frequent checking of amount of coating ejected from spray gun

the various operations in the cycle are repeated.

Castings are then placed in metal tote boxes and carried by fork lift trucks to the cleaning department. The mold coating and oxides are removed in a continuous steel shot blast cabinet. Castings are racked individually on hooks to avoid damage that might result if they were tumbled. As each casting is placed on a hook, it is hand marked with a code number from which the date, time, spinner and job number can be determined.

After cleaning, the castings are transferred to the cut-off and inspection department. Fourteen cut-off lathes crop the ends of the cylinders to correct length. One machinist operates two lathes simultaneously. In addition to giving the castings squared, machined ends, the cut-off operation is a check for machinability. All castings receive an ID check with plug gages and go-no-go gage OD check. ID tolerance must be 0.050-in. OD tolerance must be held to 0.031-in. Length must be held to 0.020-in. OD and ID must not exceed 0.020 out-of-round, and OD and ID must be concentric within 0.016-in. total indicator reading.

After castings are cut, inspected and accepted they are stored in the warehouse on pallets or in metal tote boxes. Shipments are made loose or on pallets as requested.

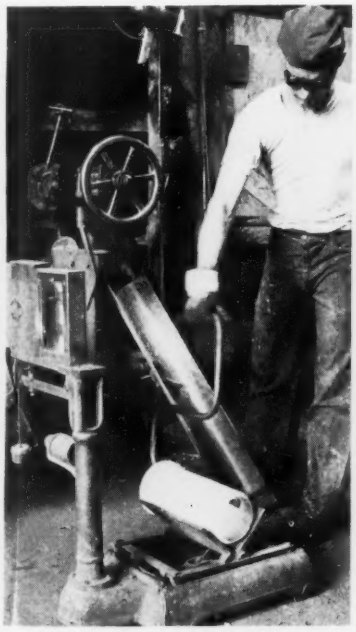
Wide Variety of Sizes—Hundreds of different sizes of cylinder sleeve castings are manufactured at Richmond ranging from 1¾ to 8-in. finished ID, and $\frac{1}{16}$ to $\frac{5}{8}$-in. finished wall, and from 2 to 16-in. finished length. To produce these castings, some 1100 molds are kept in storage. Each mold will produce about 3000 castings before its surface begins to check and spall.

To insure against shipping castings which are not machinable, statistical quality control methods are set up which involve checking approximately 10 per cent of the product. One casting from each spinner is checked for brinell hardness every 20 minutes. Hardness information is transmitted to the melting foreman immediately so that within 30 minutes after metal is taken from the spout a correction, if necessary, can be made.

At the conclusion of each shift, the accumulated hardness data for each spinning machine for that shift are added together and averaged to determine whether production for that machine is satisfactory, or whether it should be subjected to 100 per cent brinell inspection.

Thirty sample bars are checked daily in the laboratory by chemical analysis. Metal for the test bars is poured into a small sand core and chilled by cool water that runs through a section of the mold. Base iron is checked qualitatively every hour in the laboratory for carbon, silicon, phosphorus and sulphur. A spectrographic analysis is made for all other elements present in the sample bar.

Pyrometer readings are made every 10 minutes



After ejection from machine, casting is weighed to check whether ID is within limits

A casting is taken from each machine every 20 minutes and given a Brinell test under 3000 kg load

Structure, ID, OD, and length of six castings from each machine are inspected daily on each shift

Spinning Cylinder Sleeves

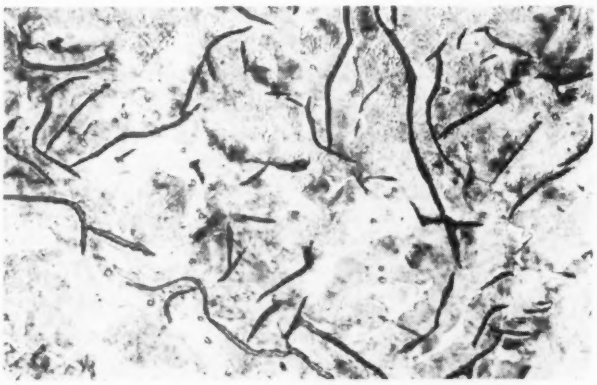
to check temperature of molten metal at the spout.

Dimensional control is further checked by rigid control of the amount of mold coating ejected from the spray gun. Spray thickness must be kept around 0.031-in. to produce acceptable castings.

At present, about 90,000 castings in a wide variety of sizes are produced each month. Scrap loss during production is approximately 7 to 8 per cent. Customer returns average 1 to 2 per cent of castings shipped. This quality production is a compliment to the company's employee incentive plan.

The incentive application generally is based upon a standard hour system; however, in the spinning department, because of the physical layout of the machines, an individual incentive plan was not applicable since one man delivers iron to more than one machine. A group machine capacity is used which is converted to the standard hour plan with individual protections included. The cropping department has operated successfully on an incentive arrangement for several years. While the spinning department's plan is only one year old, it already shows a pay and production increase of 17 per cent and a scrap reduction of about 2 per cent.

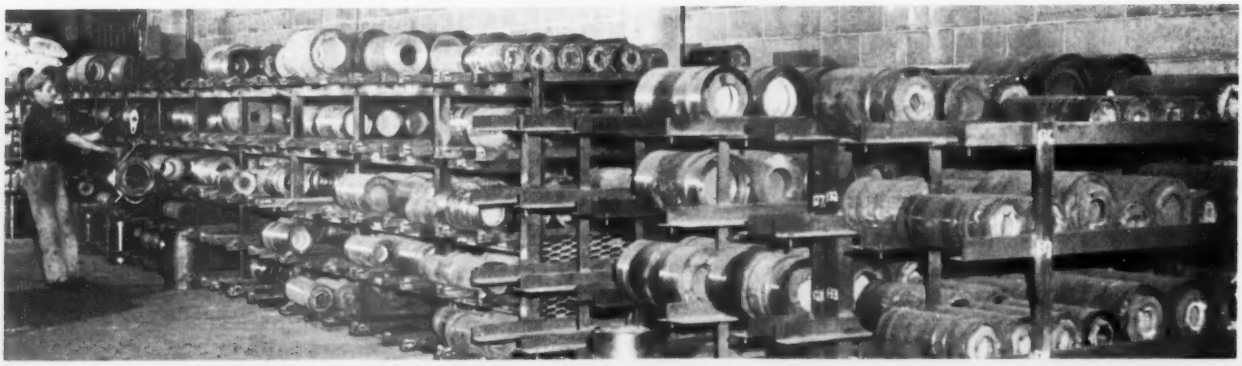
So that is how an enthusiastic group of Perfect Circle engineers in search of a less expensive method to produce better piston rings developed a proved technique of centrifugally casting cylinder sleeves, created a new product for the parent company that developed into a new business, a new source of jobs and income. The original goal has not been lost. Research and experimentation on product improvement still goes on—but with two products instead of one.



Even distribution of gray pearlite with no ferrite in centrifugally cast sleeve. X250 etched

Photomicrographs of castings are taken on this machine so structure can be classified properly

Spectrograph analysis is made for elements not determined by chemical analysis. Line densities recorded on film are interpreted by master film



Hundreds of different sized castings are made from over 1100 molds kept in storage. Each mold has a productive life of about 3000 castings

AUTOMATION

..What it Means to Foundries

We will see greater changes in the next 10 years than took place in the previous 20 or 30. We will revamp our foundry processes to make more accurate castings, improve working conditions and offer better jobs

By W. R. JENNINGS
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AUTOMATION, in our approach, means the reduction of physical labor, a consequent reduction of errors caused by faulty human judgment and, as a result, greater uniformity in products. For years we have been approaching the coming period, in which automation will be an accepted procedure in the foundry as well as in machining processes. One might say that automation begets automation. In other words, if a shop is mechanized completely, the transformation surely will be based on uniformity of castings. To insure this type of unformity, the maximum of automation will be required to remove human error.

In years past, we have been preparing ourselves for this change in the melting department, the coreroom, the molding department and in the cleaning of castings. We have obtained better control of raw materials, used better testing methods, improved equipment and employed better trained operating personnel. Operations in all departments of the foundry, for discussion purposes, are fairly well under control. Core sands, molding sands, oils, additives, etc., are fairly well standardized—at least, they are in operating control. We can predict what will or will not happen under given conditions so that in a modern foundry, equipped with presently available tools and knowledge, scrap percentages run fairly low.

In the 1940's, many foundries mechanized. In some the change was successful and profitable; in others it was a failure. Failure often was due to faulty preparation. We could explore this point in each department. Consider, for example, a foundry which for years melted and poured off in the afternoon, then suddenly required a continuous melting unit because a continuous molding unit was put into operation. In some respects the melting department was not prepared for this change in operation, and the result was losses on the unit caused by lack of preparation in the melting department, not by the unit itself.

Many new problems were presented. Melting rate possibly was slowed down, more chemically and physically uniform metal was required, and temperature control was more important since there was no chance to put the first iron into some special job or to put the cold iron in another spot. Because the cupola lining that had been perfectly satisfactory for a short heat caused trouble in 10 to 20 hours of continuous melting, it was necessary to get more information on refractories, coke, humidity, metal mixtures, continuous chemical analysis and physical qualities of the iron.

All these factors and many more were vital to the operation of a continuous melting unit. In fact, a paper could be presented on the melting changes alone made necessary by the introduction of continuous pour. Because melting problems were not anticipated adequately, foundries were bothered by cold iron, hot iron, hard iron, etc. The cupola was adapted by the addition of mechanized charging, hot blast, water cooling, etc., which have made for better control, more production, better coke ratios and lower operating cost.

The same program had to be initiated in the coreroom, which required better sand control, better baking facilities, better equipment and better coremaking methods. These were necessary to insure a core that would fit the mold, vent properly, take high temperatures, not burn in and not vein. These and other changes took place in the coreroom to make the mechanized molding successful.

The cleaning room also found new problems. Castings were no longer delivered during the night, prepared and separated for milling machines, nor were they all cold when the mill room started operation the next day. Instead, they came over continuously, just a few moments after the molding unit started. New problems had to be faced at once. Shot blast cleaning units of different types were introduced, in which castings of various sizes could be cleaned without excessive breakage.

View shows various types of cores run on two-station, hot-box core machine. The normal procedure is to blow, dwell, drain and swing the core into a curing oven

Where there was no revamping to meet new conditions, cleaning room bottlenecks, high labor costs and high breakage developed.

The whole chain of events and revolutionary changes in melting department, coreroom and cleaning room was brought about by the continuous molding unit.

Such molding units are of various sizes and capacities. However, each installation is made with the same objectives—greater uniformity, better production, less physical effort and better working conditions. To a large extent, these goals have been accomplished. But to make a continuous molding unit itself successful, a foundry had to make radical changes in its sand makeup, in gating practice, in pouring, in cooling time and in shakeout. No longer could it ram one mold soft and the next one hard, pour one slow and one fast. We seek uniformity in order to better control, to reduce the making of unauthorized decisions and to produce a better product.

A few weeks ago, looking through a British trade journal, the author saw this item in an advertisement: "Manure for sale for foundry use. Have been selling to foundries for 25 years." Without reflecting on British foundries, some of which are modern and highly productive shops, this item does emphasize, to paraphrase an old Bible axiom, "the poor ye have always with you", that the *old* ye have always with you, also. Not all foundries in America today can be classed as mechanized, but the big tonnage is produced by mechanized continuous foundries.

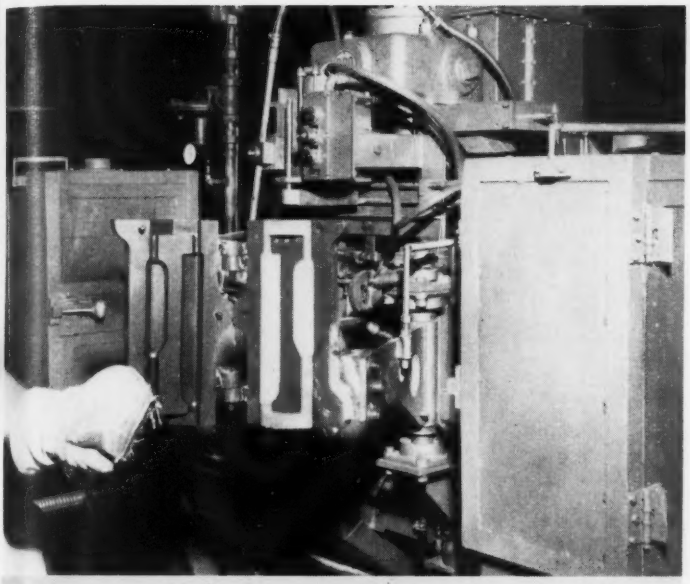
A foundry doesn't have to be big to be good, of course. It can be good in the flyweight division as well as in the heavyweight, but fighting out of its class is difficult. We probably always will need small shops, and big shops also, to handle short runs, experimental jobs and special parts. But all will have to be good to meet the coming competition and requirements for castings that can be used successfully in automatic machines.

Because we have been 20 to 30 years in arriving at our present degree of mechanization, it does not follow that we will be 20 to 30 more years in making the next big change in casting methods. We are living at a fast pace today. Many factors are creating a condition under which our improvements in manufacturing processes will be accelerated as never before. We are cramming new developments into our products so rapidly that, in reality, they are a few years ahead of necessity. The 120-mile car on a 50-mile road is an illustration.

We cannot halt this process, and these changes are coming to the foundry, also. We will see far greater changes in the next 10 years than took place in the previous 20 or 30. We apparently are due, in the period from now to the middle 1960's, to revamp our foundry processes to make more accurate castings, to better working conditions and to have more desirable jobs with fewer man-hours per ton of castings.

It is interesting to note that the percentage of wage earners in our population is just the same as in the 20's, although professional and salaried workers have more than doubled in number. Further, unskilled labor has been reduced by half. In the past, it was from this group of unskilled workers that the foundry obtained its employees.

A check of current employment records will show the difference between the educational standards of present employees and those of the 40's. The ambition of parents is, rightly, to give their children a better job and a better opportunity than they had. Consequently, an increased number of high school and college people will seek work in industry.



Hot-box core machine has two stations, operating alternately and making two cores per minute

They will not, unless in extreme necessity, accept jobs below what they believe to be their capabilities; certainly they will strive for better jobs than their fathers had. New jobs in foundries should require better educated or trained personnel.

In automation, assembly must be reduced to a minimum. Automation has been defined as "never letting go of a part until it is finished." If several parts have to be assembled, the process is complicated. For this reason, it seems to me engineering and science will really come into the foundry in this new era. (We have only toyed with it, so far.) Castings are going to have a greater demand than ever before, for by no other method can designers so readily combine or eliminate component parts. This prophecy sounds like more complex castings, and it means just that.

Today we are making castings which by yesterday's methods would have been impracticable. A typical example is hot-box cores, which are self-venting and require no driers. How many foundries have been faced with a sudden rise in production and not enough driers? This type of coremaking requires none. Cost is always important. Here is a brief rundown on this same core as made by the old and new methods.

One core made by the conventional method required the following operations: Blow, place in drier, place in oven, unload from drier, fin, brush, putty, dip, clean and after-dip. Time consumed was 1.81 minutes. Making the same core made by the two-station hot-box method required two operations: Blow and unload from box. Time consumed is 0.5 minute.

Materials for resin-bonded cores cost more. Materials for the same core when it was made of conventional sand, core oil and cereal bond cost 0.6 cent. The resin-bonded core, since it is drained of unbaked sand, weighs 1 lb. Material in this core costs 1.32 cents.

A five or six-station machine can be used in which the operator simply unloads the finished core. The whole cycle from blow to ready-for-use need not exceed a few moments. Of course, at the present time we could not make all types of cores by this method, but where it can be used, one can automate production.

Shell molding, which today is still undeveloped, will advance greatly. It has been over-advertised, but it has many features that lend themselves to automatic processes. New applications and devices are being tried almost daily, and some of these will click.

Automation in foundries has followed traditional lines and has reached the stage of the first automobile, when a motor was put in a buggy which became the horseless carriage. During this period of transition some foundries will present the appearance of an old house that we hate to part with. Additions will be made, never quite satisfactory, but still improvements. Tradition is that way, but it can and will be parted with. It frequently is less costly to start new, from the ground up, than to try to revamp and change too much of the old.

The first approach to automation in the foundry has been, as we mentioned, on the motor-in-a-buggy scale. By this we mean that we have made some rather complicated machines in order to use old processes. Vision will be needed to simplify them, and tradition may receive a severe jolt before the job is done. The need is recognized, and it will be accomplished.

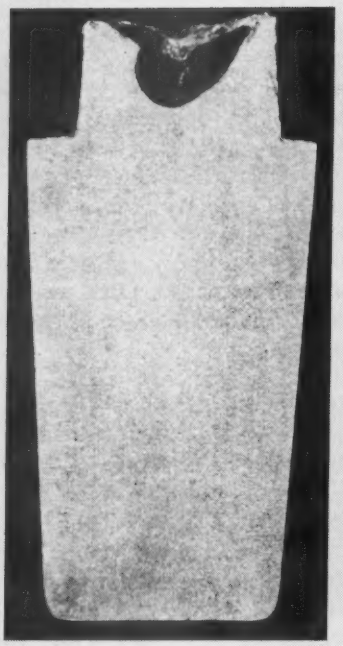
What Automation Will Bring

There are several compelling reasons for automation: Closer working tolerances, possibility of more complex design, less physical application of manpower and, we believe, a lower final cost, at least in the time factor.

We always must keep the cost or time factor in mind. As one foundryman observed facetiously, "We must have economy at any cost." We all recognize of course, that cost will be a controlling factor, particularly for peacetime products, and that pioneers do not always reap the benefit of their development. Foundrymen will be faced with varying phases of automation within the next few years. The development of control of our raw materials in coremaking, molding and melting have made this not only possible, but very probable.

Mechanization should not be confused with automation. For example, the jolt machine can make molds faster than a man can carry them away. Then automation steps in and says, "Let me carry them away." And that same thought is carried through all the processes.

We will automate our processes step by step, never quite reaching the ultimate. Some high production products can be automated now; others probably never will be within the foreseeable future. As we reduce the variables which I mentioned at the start, all this becomes more clearly possible.



Deeply etched SAE 1020 steel ingot was treated exothermically. Secondary pipe has been eliminated and hot top reduced

Cr-Ni-Mn alloy ingots show comparison of shrinkage without exothermic treatment (left) and with treatment (right)

The 200-lb steel ingot on top received no treatment. Similar ingot below it was treated with exothermic mixture designed for steel. Deep etching shows absence of secondary pipe in treated ingot

BETTER CASTINGS WITH LESS METAL

New rapidly igniting exothermic compounds developed for use on particular ferrous and nonferrous metals have been used on open risers and hot tops of ingots to end excessive piping and shrink cavities

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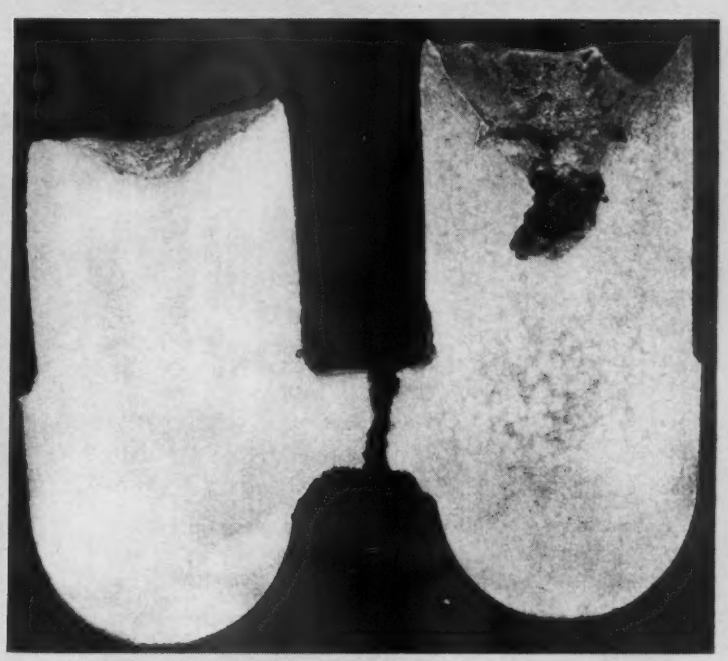
Hot tops from high Cr-Ni ingots cast as usual and without treatment (top) and with half as much metal, exothermically treated (bottom)



Shrinkage cavities in risers from large gray iron castings after treatment with an exothermic material (left) and without exothermic material (right)

NEW rapidly igniting exothermic compounds have been used on open risers of castings and on hot tops of ingots to eliminate excessive piping and shrink cavities caused by premature freezing of the feeding metal. The exothermic material is added to the top of the riser or to the hot top without the necessity for fabricating sleeves or other shapes from the material.

To eliminate any danger of contamination, specific exothermic compounds have been developed for use on ferrous metals, aluminum alloys and brasses or bronzes. The reaction products are easily removed from the cold risers or from the hot tops so that the riser or hot top can be remelted without increasing the amount of slag and without contaminating the metal.

The new compounds produce sufficient heat by exothermic reaction to increase the temperature of the feeding metal well above that of the metal in the rest of the casting. This makes it possible to decrease substantially the height and weight of the riser or hot top. The high temperature of the feed metal, and the thermal insulating properties of the reaction products, cause the feeding metal to remain liquid longer. This assures adequate feeding while the casting solidifies and cools.

Skin Formation Delayed — These exothermic compounds delay the formation of a skin of solid metal on the top surface of the riser or hot top until the casting and most of the other metal in the riser have solidified. As long as this skin does not form, atmospheric pressure also aids in the feeding of the liquid metal to the casting.

One type of new exothermic product for iron and steel has been used on cast iron, Duriron, a Cr-Ni alloy, high-Cr heat-resistant steels, Mo steel, and SAE 1020 steel, with excellent results in the elimination of shrinkage and reduction of piping.

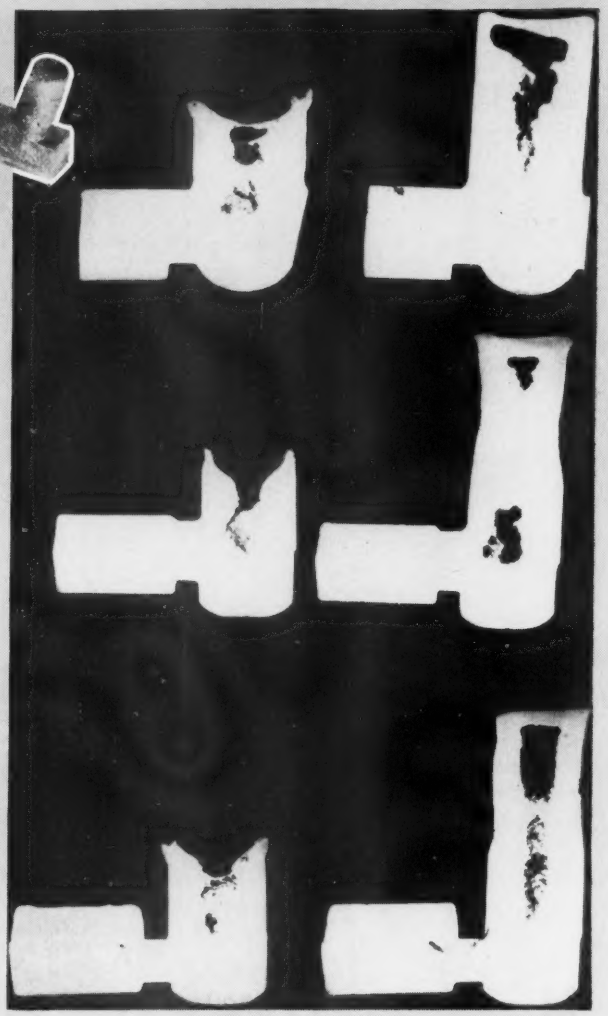
As one example, a Cr-Ni alloy steel keel block with a head 12 in. deep was being cast in sand by conventional practices. The pipe was always too deep for the casting to be of any use. By using the exothermic material on the risers, the keel blocks were entirely sound, and the pipe in the riser was so short that metal from the head was often used for test pieces.

In another instance, airplane engine valves of a high chromium-nickel alloy were being cast in sand with a 4-in. head above the casting. By using an exothermic material on the riser, the height of the head was reduced by about one-third.

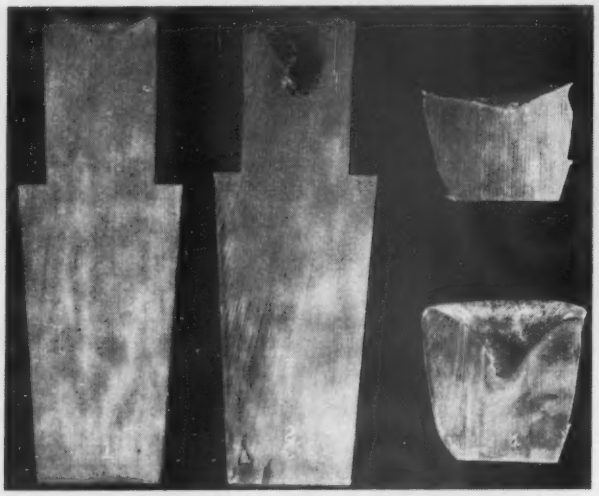
In still other cases, the same exothermic material was used to decrease the required riser height on a casting of Cr-Ni-Mn-Si heat-resistant steel by about one-half, and to eliminate shrinkage defects from both the casting and the risers of Duriron.

Feeding a Bronze Casting—The successful commercial use of a second type of exothermic material designed specifically for copper-base alloys is illustrated by the following example. A hydraulic-valve casting of bronze was giving considerable trouble from unsoundness because of the design of the casting. The casting was a cylinder 7¼ in. in diameter and 5 in. high with a connected smaller

Risers on steel castings show sizes required to produce sound castings with exothermic treatment (at right) and without treatment (at left)

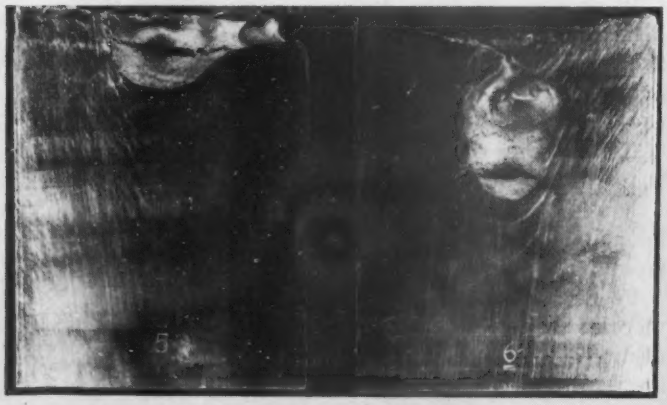


Risers in view at upper left were split here to show section through risers. Untreated risers are at the right and treated risers at the left

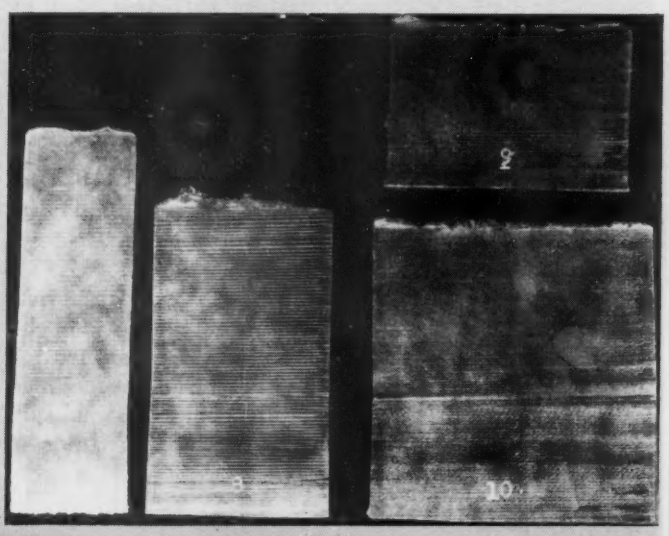


Effects of exothermic materials on hot tops and risers of copper-base alloys: Left, 85-5-5-5 alloy ingot, treated. Center, untreated 85-5-5-5 alloy ingot. Top right, treated yellow brass riser. Bottom, untreated yellow brass riser

Cylindrical castings of 80 per cent Cu, 10 per cent Sn and 10 per cent Pb were treated with an exothermic material. Diameters of castings are as follows: Left, 2¼ in. Center, 3½ in., Upper right, 4½ in. Lower right, 5¼ in.



Cylindrical castings of manganese bronze. Left one was exothermically treated; right was not



cylinder 4 in. in diameter and 2½ in. high.

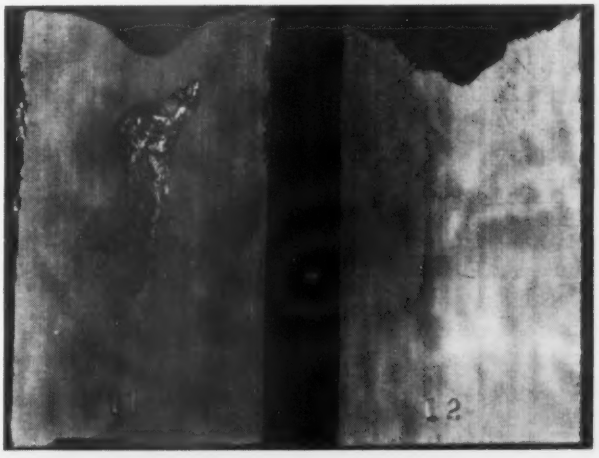
Because of difficult coring, the casting was made vertically in sand with the large section on the bottom and away from the riser. A riser 4 in. in diameter and 4½ in. high was used above the smaller cylindrical section. The casting and riser, as originally engineered, weighed 75 lb. The riser proved to be inadequate for feeding the heavy section of the casting. To overcome the porosity and shrinkage, the casting was finally made as a 7¼-in. diam cylinder, 12 in. high, and the upper portion was machined to 4 in. in diameter. The casting and riser weighed 176 lb in this case.

The original method of risering the valve was then tried with 2 in. of the new exothermic material for bronze and brass added to the top of the riser. The casting was sound, machined up without defects, and withstood the most rigid hydraulic tests. By using the proper exothermic material in the riser, the casting is now being made with 65 lb of metal in the casting and riser, instead of the 176 lb originally required for a sound casting.

Application to Aluminum—A third type of exothermic material for aluminum alloys was particularly impressive in the casting of a 125-lb aluminum fan blade. Usually, the casting was made with a 7-in. diam riser and six chills in the mold to assist feeding of the casting. The chills were necessary, but were expensive to place and maintain. By using on the riser the new exothermic material designed specifically for aluminum alloys, it was possible to eliminate the chills and to reduce the riser weight from 16 lb to about 8 lb for the 125-lb casting.

Because of their pelletized form, the new exothermic materials are convenient to store and handle, and are clean. They ignite readily and react over a controlled period of time to give the metal in the casting sufficient time to solidify. The slag products of the exothermic reaction strip easily from the risers. Contamination of the metal even at the top of the risers in contact with the exothermic material is so low that it is insignificant in most cases. Continued remelting of risers treated with these exothermic materials has not caused trouble from contamination in commercial foundries.

Proper use of the new exothermic materials gives two major types of advantages: (1) economic, and (2) technical. Yields are increased, rejects due to unsoundness are reduced, and a larger number of castings or ingots can be poured from a single ladle of metal because less metal is used for risers.



Right, these cylindrical castings were made of aluminum bronze. The casting on the left was not exothermically treated, but right one was

Below, risers from castings of aluminum alloy 355. Left, untreated riser 7 in. in diameter is from a 125-lb fan blade. Center, a riser from same casting was treated. Feeding was improved, yield increased, riser size reduced. Smaller treated riser at the right shows similar effect

Human Relations in

This is a condensation of a talk given before the annual Alumni Dinner of the American Foundrymen's Society at the recent Houston convention

By CAL C. CHAMBERS
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THE most important factor in the success of any business enterprise is the people who constitute it. Edward McSweeney, treasurer, Perkins-Goodwin Co., New York, made this observation at a recent meeting of the Associated Industries of Massachusetts:

"What do we really manage? Plants, perhaps? Processes? Accounts? Sales? Finance? One or all of them plus even others? It makes no difference. Each is one or more steps removed from actual operations. What we really manage is people. . . Work well with people and you and your enterprise will prosper. Work ineffectively with people at whatever level and you are bound to fail."

MAN is the genesis, the heart, the soul and the lifeblood of our foundry industry.

It is more important now than ever before that foundry executives focus their interest on the individual MAN and emphasize that approach in all management and human relations activities. Many forces are working to drive a wedge of misunderstanding and distrust between front office and foundry. They wish to substitute for intimate, personal relationships between management and employees a protest-and-pressure type of group relationship which assumes that participation in a business enterprise must be divided sharply and antagonistically into two *class* categories—labor and capital.

More and more, unions are demanding, in contract negotiations and in proceedings before the National Labor Relations Board, that all relationships with employees, except those specifically pertaining to job instruction and supervision, be channeled through the union organization, rather than carried out directly and personally with each individual person.

It is time for foundry executives to intensify their human relations activities to counteract this avowed union purpose. We must build up a sympathetic and co-operative understanding and mutual respect and regard. These stem from man-to-man contacts and free interchange of assistance in all aspects of daily living at work and at home.

To supplement my general observations in this field, I addressed a letter to 43 personal friends in the foundry industry who are presidents or general managers of plants—some large, some small—in all parts of the country. This is the question I put to them:

> What policy, plan, program, procedure, method or technique has contributed most to good employee relations in your plant and has helped best to develop high morale, co-operation, loyalty, sympathetic understanding, dependability, efficiency, high productivity and individual incentive among your hourly workers and salaried people?

I shall summarize the splendid suggestions outlined in the replies I received.

"Company Character"—There was almost unanimous agreement as to what constitutes the most important element in an effective human relations program. That element can be briefly termed "company character."

By that I mean the attitudes, ideals, objectives and integrity that characterize the record of the company management. If management has a sincere conviction that each member of the organization is a person of dignity and noble purpose who deserves to be treated as a free soul and an equal human being, entitled to respect and honesty and courtesy and sympathy and thoughtfulness and encouragement and fair play; if supervision and authority are exercised with meticulous and unvarying fairness; if there is complete, straightforward frankness and honesty in official word and deed; if opportunity is provided for all in proportion to capacity and ambition; if merit is rewarded generously and without bias; and if leadership is inspiring rather than domineering, then a high standard of company character exists. The basic philosophy and leadership qualities of top management largely determine the character of a company.

The May-June issue of *Harvard Business Review* contains a thought-provoking article on "Skyhooks" by O. A. Ohmann, in charge of management development at Standard Oil Co. of Ohio. Mr. Ohmann says, "The function of a managing executive goes far beyond being a likeable personality, or applying correct principles of organization, or being skillful in the so-called techniques of human relations. I am convinced that the difficulties many executives have with supervisory relations springs from one's conception of his function or role as a boss, his notion about the origin and nature of his authority over others, the assumptions he makes about people and their worth and his view of what he and his people are trying to accomplish together."

Then Mr. Ohmann goes on to describe the philosophy of one extremely successful executive of his acquaintance.

"This executive assumes that each individual possesses certain God-given rights of self-direction which only the individual can voluntarily delegate to others in authority over him and that this

is usually done in the interest of achieving some mutual co-operative good. . .

"He assumes that in the course of this industrial operation each individual should have an opportunity to develop the maximum potential of his skills. As supervisor he must set the working conditions and atmosphere which will make it possible for his employees to achieve this dual objective of increasing productivity and maximizing self-development.

"There is nothing 'soft' about his operation. He sets high quality standards and welcomes stiff competition as an additional challenge to his group. He, therefore, expects and gets complete co-operation and dedication on the part of everyone. He manages with a light touch that releases creativity, yet with complete confidence in the outcome.

"As you would suspect, people like to work for him—or with him. . . People respond to his leadership because he has faith in them and expects the best in them rather than the worst. He speaks well of the members of his organization, and they appear to be proud of each other and of their record of performance. He takes a keen interest in developing measurements of performance and in bettering previous records or competitive standards. He feels that no one has a right to 'louse up a job'—a point on which he feels the stockholders and the Lord are in complete agreement."

Personal Recognition—Rated second and almost equal to company character as essential to the success of a human relations program was personal recognition.

I am sure that many of you have heard of or read the writings of Whiting Williams, author of *What Makes Us Humans Tick* and a labor relations expert, who has made an international study of worker attitudes and motivations. Mr. Williams contends that the average industrial worker seeks, above all else, recognition of his dignity as an individual and of his importance as a member of a team. The satisfactions a worker gets from such a feeling of recognition and importance transcend even his desires for job security and good wages, which rank next on Mr. Williams' list of worker motivations.

Nothing is more annoying or discouraging to any human being than being ignored or treated as though he represented no value whatsoever. Little things done with a personal, individual touch are much more effective than a formal program administered by the personnel department. Absenteeism, for example, too often is dealt with in a punitive manner when it really offers an opportunity for constructive personal recognition.

One of the most hoped for and rewarding forms of personal recognition is, of course, promotion. From trainees to executives, every member of any organization is striving for advancement, whether by transfer, upgrading, appointment to higher classification or mere piling on of added duties and responsibilities. Several answers to my letter made much of the policy of "promotion from within."

The suggestion box plan as a form of stimulating employees to thought and effort that will merit personal recognition is used in many plants, with varying success. Such a plan often defeats its useful purpose because suggestions are too nebulous or impractical to be of value, similar to ideas previously discarded, or already under management consideration or are prohibitive in cost. When the employee making the suggestion is given a rejection slip or a reward he considers inadequate, he accepts it as a rebuff or as a lack of proper appreciation, and that is the very antithesis of desirable personal recognition.

Continuous Communication—Rated third in the list of elements considered essential to the success of a human relations program was continuous communication.

Organization activity, operating procedures or personal relationships of any kind are impossible without communications. To be effective, communications must be carried on continuously and must work both ways—down from top management and up from the humblest unskilled laborer.

The objective of continuous communications should be complete understanding by each employee of his duties, responsibilities, rights, privileges, obligations and relationships within the company organization and all of the things that pertain to his job and skill, his pay and welfare benefits and his opportunities for advancement.

No means of communication is more effective than face-to-face verbal contact. It is unfortunate that many foundry executives are so busy with administrative problems that they have little time to stroll through the plant and say a personal word to their people.

Some companies shy away from mass meetings because of the "captive audience" problem, but the courts have upheld the right of an employer to address his employees *en masse* where there is no coercion or other violation of the Taft-Hartley Law. A plant-wide meeting on a voluntary attendance basis with pay for the time involved will provide a golden opportunity for a foundry executive to keep all his people informed about the company and its people and give everyone more intelligent appreciation of what is happening that affects his life and pocketbook.

It may sound as though I were advocating revealing much information heretofore regarded as no business of employees below company officer rank—not to mention the "man-on-the-street" and union officials to whom such information is likely to be repeated. I submit, however, that a climate

of sound human relations, both within and without an organization, can be created more favorably by a complete and accurate explanation of the whys and wherefores of what a company does and stands for than by maintaining a dignified and aloof attitude in the face of rumors and bits of misinformation which create misunderstanding and distrust.

Time To Take the Offensive—It is time for the managers of American business, including all foundry executives, to take a more aggressive attitude to combat destructive forces which have attempted to discredit business and management as a class and weaken our free enterprise system. One of the best ways to do it is to sharpen the technique of continuous communications by laying down a counterbarrage of factual information and explanation of true conditions and situations.

That leads me to refer to one of the most articulate and powerful mediums we have in the field of continuous communications — company publications. A great opportunity exists for improvement in the editorial policy and content of many company publications which becomes more strikingly apparent when a comparison is made with similar publications put out by the unions.

Again, I turn to the May-June issue of *Harvard Business Review* and an article by Fred C. Foy, president, Koppers Co., on "Union vs. Company Publications." Mr. Foy said, "Only the unions are vigorously and effectively driving home to their members their arguments and their point of view. Week after week, they pour out a flood of carefully planned and well-written articles which, irrespective of geographical area or union identity, advocate more government participation in the economy and reflect a solid front on almost every major policy and economic question.

"In contrast, management publications regularly reaching the same union members fail, with only a few exceptions, to present any point of view about what management feels is good for America. Usually well written and often beautifully printed, they cover mainly employee social news, company sports activities and brief news reports about the company. For the most part they are conspicuously silent on such basic subjects as the profit system or on key current issues before the legislature."

Fitting the Man to the Job—Number four on the list of elements most frequently referred to in the replies received as essential to the success of a human relations program can be grouped under the general heading *"selection, assignment* and *training."*

There appears to be a growing interest in and use of psychological testing to measure the capacity and potential of applicants of all kinds. Personnel interviews and application forms do not always supply the intimate, thorough information about an applicant's personality traits, emotional stability and mental fitness that is important for a scientific appraisal that may eliminate hasty and faulty hirings and reduce organization turnover and excessive absenteeism.

Psychological tests have been validated by widespread use and are quite simple to administer. I recommend them highly for use by any company constantly in the market for new people in sufficient numbers to justify setting up the proper procedures.

After hiring comes the problem of assigning and orienting new employees so as to fit the "round pegs in the round holes and the square pegs in the square holes." One company is solving this problem by using psychological aptitude and placement tests. They are equally valuable when a vacancy is to be filled by promotion. The cost of installing a program of psychological testing in a company personnel department and employing outside consulting and advisory services of expert industrial and clinical psychologists is modest compared with the cost of turnover.

Improvements in methods and equipment through industrial engineering practices usually are considered in the category of plant operations, but important aspects involving training and communications fall well within the area of human relations.

Too often such improvements originate with technical people on the management staff and are put in effect down through different levels of control and supervision as directives to be carried out by supervisors or workers who have had no part in originating and developing the idea or the equipment item involved.

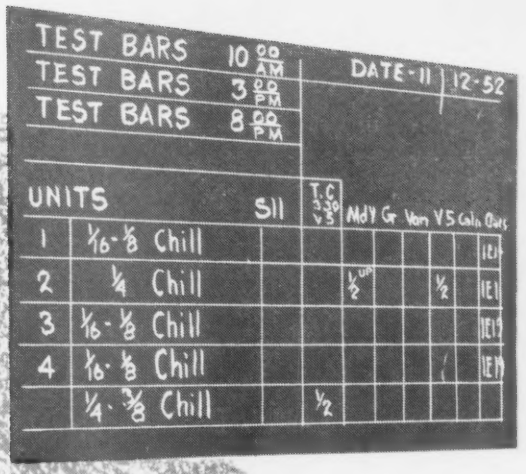
The tested and proved human relations technique of "getting-everybody-into-the-act" is being used effectively by many companies to implement the specialized skill of such experts and to obtain greatly improved co-operation and teamwork throughout the entire organization. Opportunity for the improvement to be accepted and put into effect successfully is greatly increased because the individual feels that he has had a personal part in its development.

Promotes Human Relations—Work simplification programs have been conducted in scores of representative American industries. All of these companies report beneficial results in improved individual efficiency, increased production and lower costs, but the most significant benefits reported in a nationwide survey have been in the area of human relations.

One enthusiastic advocate of work simplification summed up the benefits obtained for his company in these words: "The improvement in employee attitudes has been so substantial as to make the program desirable entirely aside from any actual cost savings or any increased efficiency that may have resulted from the program."

There can be no question that the area of incentive compensation offers one of the most fruitful fields for building a sound and equitable foundation for good human relations. Incentive pay for hourly workers, based on piecework, standard hours, group bonuses, productivity precentages or Christmas bonuses, are so common in the foundry industry as to require no further elaboration. Incentives for management staff people are more varied and tailored to suit the characteristics and the resources of individual companies.

Who Should be Responsible for Quality Control?



By itself, technical know-how does not guarantee an effective quality control program. In this article, the author suggests where responsibility for the program should be placed in foundries of various sizes

By KENNETH M. SMITH
Foundry Consultant

QUALITY control gradually has acquired a position of major importance in foundry management. Through technological advancement and the application of statistical methods, it now is ready to claim scientific status. Many shops that worked tirelessly to develop these two areas now are struggling with the problem of co-ordinating them with other foundry functions.

By itself technical know-how does not guarantee an effective control program. Foundries throughout the industry are the proof of this statement. With these shops in mind, this article was written to enumerate the considerations which should be made before a quality control program is set up.

Quality control is made up of many elements. Although we are concerned primarily with co-ordinating staff functions with line functions, we cannot do so properly unless we first evaluate each function involved and establish the true relationships between them.

We must keep in mind that an evolution has taken place in which the responsibility for controlling quality has changed hands many times. Those who have participated in this work include the skilled worker, the muller man, the sand control technician, the cupola operator, the inspectors, the shakeout supervisor, the foundry foremen, the pattern shop foreman, the metallurgist, the statistical engineer, the technical engineer, the foundry superintendent and top management.

Some in this group who formerly played a major role now find themselves being relieved of their responsibility to a great extent. However, with so many opportunities to assign responsibility, it is inevitable that we would have a large number of combinations, with varying degrees of authority delegated to each member of a group. When one sees one of these combinations at work, it does not always imply that management is satisfied with its particular arrangement. It often indicates that quality control in that shop is going through one stage in the evolution process.

In our study of the functions we will try to determine the main areas of responsibility and to establish the natural boundaries of each function in the light of modern advancement. This reappraisal is necessary for the best results. As we start to separate the various functions into categories for closer analysis, we can find the key to the initial breakdown in a phrase used in connection with statistical controls. It is said of these controls that they inform us "when and where" quality problems exist. This term describes an area of "know-when and where."

Using the same terminology, we may say that management comprises the area of "know-why" and that all the other functions in quality control belong in the area of "know-how." Since these three areas represent the essential requirements of a successful quality control program, it is to the interest of management to take advantage of the best talent it has available in the other two areas. Our

purpose now is to determine the sources for the talent we need.

Area of "Know-how"—If one reviews the members of this group, it is apparent that two types of know-how are represented. Those that fall in the category of supervision have the type of know-how that is a combination of both production and technical. At one time this group possessed a high percentage of the available technical know-how, but, because of production demands, its members were unable to keep up with the countless volumes of technical literature and the millions of hours of research which have been added to the picture.

Today when we need the best technical talent, we must look for it in men who devote full time to the subject. The technical field in the foundry is very broad, and when responsibility for a wide range of technical functions is involved, management must choose a man with adequate technical experience. Those in the group who have specialized technical training play an important role in quality control and are granted limited authority. There is also an important place in quality control for those in the supervisory group. It will come up for discussion in another section.

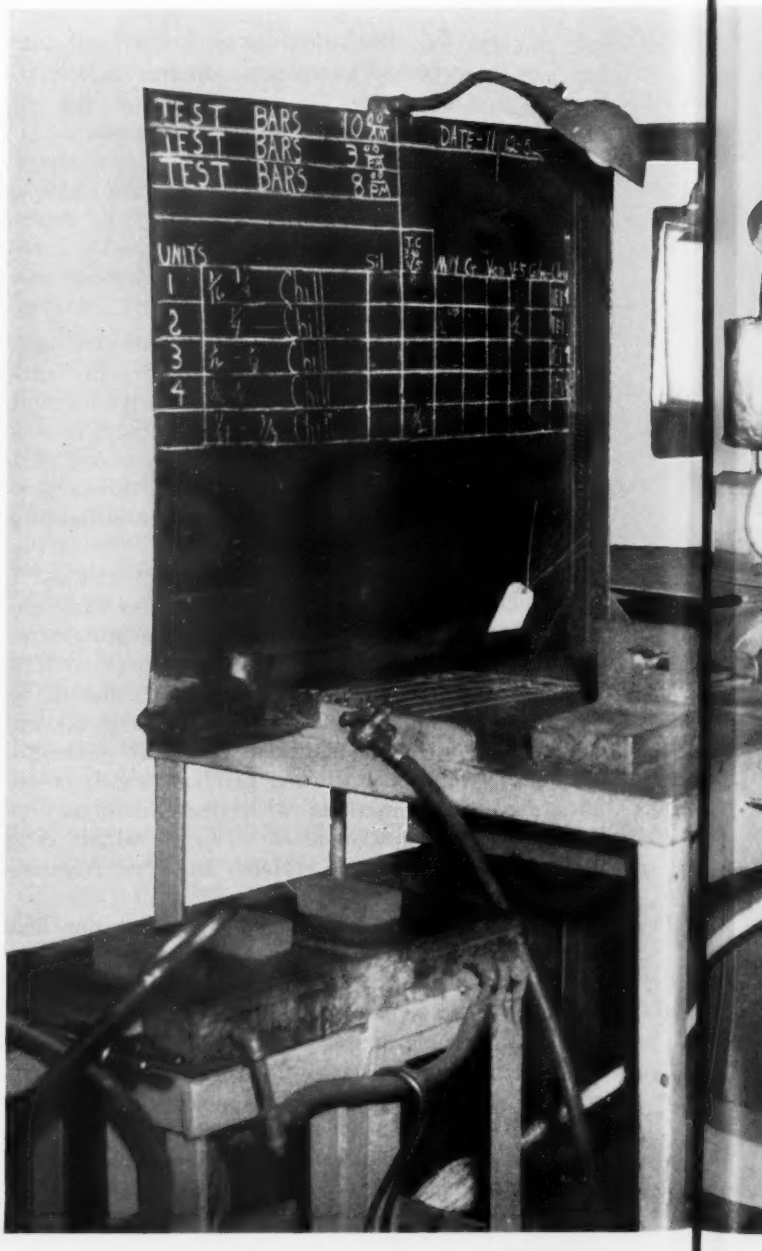
Area of "Know-when and where"—As foundrymen gained the technical ability to solve quality problems, they became more aware of the need to locate the source of the problems in time to put their knowledge to work. Even when we were fortunate enough to locate the source quickly and set up controls, the very same problem had a habit of coming back to plague us from time to time. Statistical controls have more than corrected these conditions.

Without doubt, statistical methods provide the best means ever devised to determine "when and where" quality problems exist. In their attack on variables they go to work with the accuracy of a guided missile. They tell us what we can normally expect from each foundry process as we have set it up. They separate the normal performance from the abnormal in a way that makes it possible to concentrate our efforts on a small number of abnormal conditions. They let us know when we must change our over-all method to improve quality further and detect the point where it is not economical to make further improvement. In addition, they often forewarn of impending trouble and permit a reduction in sampling, testing and inspection.

The majority of foundries have yet to get acquainted with statistical controls, but one is safe to wager that the shops which have added this function will never depart from it. Without statistical controls, the closest we can come to covering the very important area of "Know-when and where" is to make as much use as possible of the foundry quality data which provide the basis for all statistical controls. Intelligent use of the data does a fair job in telling us "when and where" we run into quality problems, but this method never can compete with statistical controls for maximum results.

Area of Know-why"—The entire responsibility for organizing and administering a quality control program is a top management function. Foundry tradition and earlier concepts of how control should be organized go out the window when management decides to take advantage of technical progress. It is only when management has recognized the real opportunities in quality control, has made a decision to create an effective program and has seen the need for taking full advantage of technical ability, that it is faced with important decisions in the matter of co-ordination.

It never is easy to establish a sharp division in responsibility between staff functions and line functions, yet overlapping must be avoided. The time has come to treat quality control as a separate function, and the separation must be accomplished in about the same manner as were those of purchasing, industrial relations, costs or any of several other functions. No man can be responsible for both production and quality without compromising



one or the other. Both are so important in modern competition that top management alone must make whatever compromise is necessary.

Quality control can yield very worthwhile rewards if management agrees with the principles brought out up to this point. Only reasonable care is necessary to organize a smoothly operating program along these lines. If we adhere to the spirit of relationship between line and staff functions, the technical and statistical functions can be entirely separated from the supervisory function without difficulty. For the most effective control over quality, the following type of organization is recommended.

A member of top management accepts a position as executive head of quality control. The duties are administrative, not time-consuming. A man with broad technical experience then is appointed to be the full-time operating head of quality control. The foundry suprintendent and the operating head of quality control are both made responsible to the executive head of quality control.

In order to avoid setting up statistical control as a separate function, it is advisable to have the operating head learn statistical method and grant him a full-time clerk to do the routine statistical work. Statistical control knowledge can be acquired in a surprisingly short time and at a comparatively low cost.

The next step is to group as many as possible of the foundry quality operations and techniques. This must be done with only the strictly quality operations, which include all melting operations, sand preparation, laboratory work, heat treating and all testing and inspection operations. Also included are such functions and techniques as gating and risering, casting design, raw material specifications, research and experiments, setting up controls (statistical and otherwise), casting defect analysis, etc. The full responsibility for the men and subjects included in this grouping is then turned over to the operating head of quality control.

So far we have tried to include everything technical which is not actually part of the production process. We must now establish the relationship between quality control and the production process. This relationship can only be successful on a co-operative basis. Any recommendations which have to do with the making of molds, cores or patterns and the cleaning and shakeout operations must be submitted to the foundry superintendent. He should arrange for the recommendations to be carried out. If the operating head expects to receive a full measure of co-operation, he must avoid making recommendations which will impede production. In fact, he always should strive to make increased production possible through development of good workability and high flowability in the molding and core sand mixtures.

To protect the co-operation principle between the production departments and quality control, the executive head of quality control should make it part of company policy. Ideas to improve quality or control should be welcomed from both divisions, but any sign of competition between these divisions on quality subjects should be frowned upon. Even with this policy in effect there will arise honest differences of opinion which call for management decisions. The executive head should make himself available to render these decisions, granting both sides an opportunity to be heard.

In conclusion, the author feels that technical ability should be the major consideration in quality control and that this function should be separated from the supervisory functions for the best results. To avoid a morale problem between the key men in the foundry proper, both production and quality control should be co-ordinated and controlled by a member of top management. Quality control programs in operation now have been organized in the above manner, and the results are extremely gratifying. This type of program can be set up in all but the smallest of foundries, when the technical ability is there. Foundries which are weak technically should make every effort to overcome that handicap in order to meet competition.

Blast Equipment Maintenance

Can Save You Money

By L. M. JOHNS
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BLAST CLEANING equipment is used in many industries, but nowhere receives harder use than in foundries. The type of cleaning required on the products of this industry impose unusual hardships on machines, and for this reason the problem of equipment maintenance is extremely important.

Two distinct types of centrifugal blasting barrels are used in foundry cleaning rooms, the batch-type barrel and the continuous blast barrel.

Batch-Type Barrels—In foundries, batch-type barrels greatly outnumber continuous blast barrels. As its name indicates, the batch-type barrel is designed to take a load of castings, blast them clean, unload them and process the next load. Usually these machines are equipped with a power-operated loading device large enough to hold one full batch. The barrel itself is essentially a drum with a moving conveyor at the bottom drum to hold and tumble the work during blasting. This conveyor is reversed for unloading the machine.

Centrifugal abrasive throwing wheels are mounted in the top deck of the machine to blast down into the work cleaning drum area. The number of wheels used is governed by the capacity of the machine. Because the entire blasting energy is confined within a relatively small area, flying abrasive ricochets heavily and continuously within the blast chamber during operation. *From the standpoint of both production and maintenance it is important to clean a full load of castings because a full load protects more areas of the machine from the blast stream and ricocheting abrasive.* Furthermore, a full load generally can be cleaned in the same time required for a partial load, thus keeping the machine producing at maximum capacity.

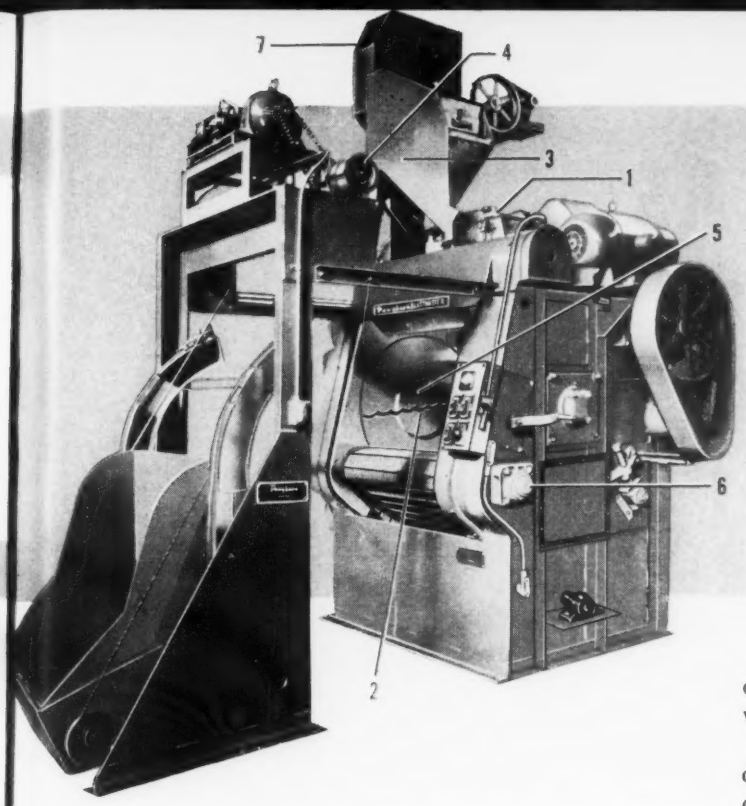
Another important factor in operation of a batch barrel is effective separation of abrasive, as it is recirculated for use in the centrifugal wheel. It has been established that sand, sand dust, and other refuse in the abrasive supply will cause greater wear on the wheel parts than clean metal abrasive. Most batch-type barrels are equipped with an efficient abrasive separation and cleaning system. It is quite important, however, that operators and maintenance men make sure that the separating system is properly maintained and adjusted so that abrasive returning for reuse will be as free as possible from contamination by sand and sand dust.

The abrasive separator should be served by a dust collecting system of sufficient capacity to provide not less than 2 in. water gage suction on the separator. This arrangement will insure maximum life from parts contacted by the abrasive and obtain maximum cleaning energy from the abrasive.

All interior parts of the barrel contacted by the work to be cleaned and by the abrasive are subject to extreme wear. The areas subjected to the greatest wear are protected by long-lived wear plates, rubber and other means of resisting abrasion. All interior wear surfaces should be checked carefully once each week so that any worn part can be replaced promptly before damage is done to the parts it is protecting.

Because the centrifugal abrasive throwing wheel handles up to 30,000 lb of abrasive per hour per wheel, all parts of this unit contacted by abrasives are subject to extreme wear. *The wheel unit should be checked carefully at the end of each shift to determine whether any parts will not perform satisfactorily through the next shift.* Any parts that will not should be replaced. Very effective wear resisting materials have been developed for wheel parts, but they bring a new problem. Because of the long life provided by these new materials, a tendency can arise on the part of operators or maintenance men to neglect to check them at regular intervals so that they become worn past their efficient or protective life. *When a machine is operated with parts worn past their normal efficiency, production is reduced and maintenance cost increased.* Obviously, a policy of regular inspection and replacement can prevent these difficulties.

Weekly lubrication of the blast barrel is another important maintenance requirement. These barrels are designed with the least possible number of moving parts and bearings in order to eliminate as many wear points as possible. However, all bearings must be kept well lubricated to assure



IMPORTANT ITEMS TO WATCH

1. **Check centrifugal wheel feed parts and vanes at end of each shift.**
2. **Keep *Work Load Level* at point recommended by manufacturer.**
3. **Adjust separator to keep abrasive clean.**
4. **Clean refuse screens regularly.**
5. **Inspect drum end plates and other interior drum parts weekly, and make replacements as indicated.**
6. **Lubricate all bearings weekly.**
7. **Keep elevator belt adjusted.**

maximum efficiency and lowest possible maintenance cost.

The elevator which takes spent abrasive to the top of the machine for separation and then back to the blast wheel usually is a conventional type of elevator using a rubber-covered belt with abrasive-resistant metal buckets. It requires very little attention, but should be inspected at regular intervals to insure correct alignment and to check the buckets for wear or damage. It is very important that the belt run without slipping on the drive pulleys, and a means for adjusting tension is provided. A new belt will stretch considerably, however, sometimes to the point that the tensioning device will not permit proper tension. In this case the belt should be shortened so that proper tension can be obtained at all times.

Screens are provided, at the elevator discharge and over the screw conveyor which carries abrasive back to the elevator buckets, for the purpose of retaining over-sized refuse which would give trouble if it returned to the separator on top of the machine. The operator should check these screens regularly and remove the refuse to avoid excessive build-up and subsequent operational difficulties. The period of time between checking and cleaning these screens can be determined by observation. Some blast operations cause the screens to build up refuse rather quickly; others do not.

Continuous-Type Barrels—The continuous centrifugal blast cleaning barrel is loaded by a continuously operating in-feed conveyor which discharges dirty work into the feed end of the machine. The loading conveyor must be loaded evenly and operated at a speed which will maintain the correct load height within the barrel drum. The manufacturers' operating instructions specify this proper load height, and operators and maintenance men should make sure it is maintained, but not exceeded. Continuous cleaning barrels are equipped with a variable speed drive so that rotation of the drum can be synchronized with the loading conveyor in order to maintain proper loading.

The continuous barrel generally is of simple construction and is easy to maintain. Main points of wear are the centrifugal abrasive throwing wheels, which are approximately the same type as those used on batch-type barrels. They are maintained in the same way.

Drum liners and conveyor slats must be inspected regularly and replaced when they become worn. They should not be permitted to wear to a point where operating difficulties or damage to other parts will occur. More durable parts, such as drum rollers and tires, sprockets and the chain driving the transfer conveyors, must be inspected at weekly intervals and repaired when required. Monthly inspection attention also should be given to the main shafts which carry the weight of the barrel drums as well as to the thrust rollers which keep the drum in proper operating position and adjustment.

The transfer conveyor chain should be lubricated at weekly intervals with a mixture of 50 per cent S.A.E. No. 10 oil and 50 per cent penetrating oil. A spray gun can be used for this operation, which prevents the chains from freezing with abrasive dust. If the chains are lubricated at weekly intervals with this mixture, no unusual trouble or extreme wear will result.

It is quite important to maintain a clean abrasive supply to the centrifugal throwing wheels at all times. Close attention should be given to the entire abrasive handling system, particularly to adjustment of the abrasive separator. A suction of 2 in. water gage should be provided at the abrasive separator. The screen over the screw conveyor should be inspected at daily intervals and cleaned of any debris that has accumulated.

Because of the nature of the work done by blast cleaning barrels, handling abrasive and throwing it at high velocities, and because of the sand and other debris that must be handled or removed from the reused abrasive, the service obtained from any centrifugal blast cleaning barrel depends to a great extent upon proper maintenance and operation.

CENTRIFUGAL CASTING

With a German, Water-Cooled Machine

The authors describe the design and operation of a German centrifugal casting machine, which was used for large-scale gun tube manufacture during World War II, and compare it with its counterpart in the U.S.A.

By P. J. AHERN
Metallurgist, Rodman Laboratory
Watertown Arsenal
and
J. F. WALLACE
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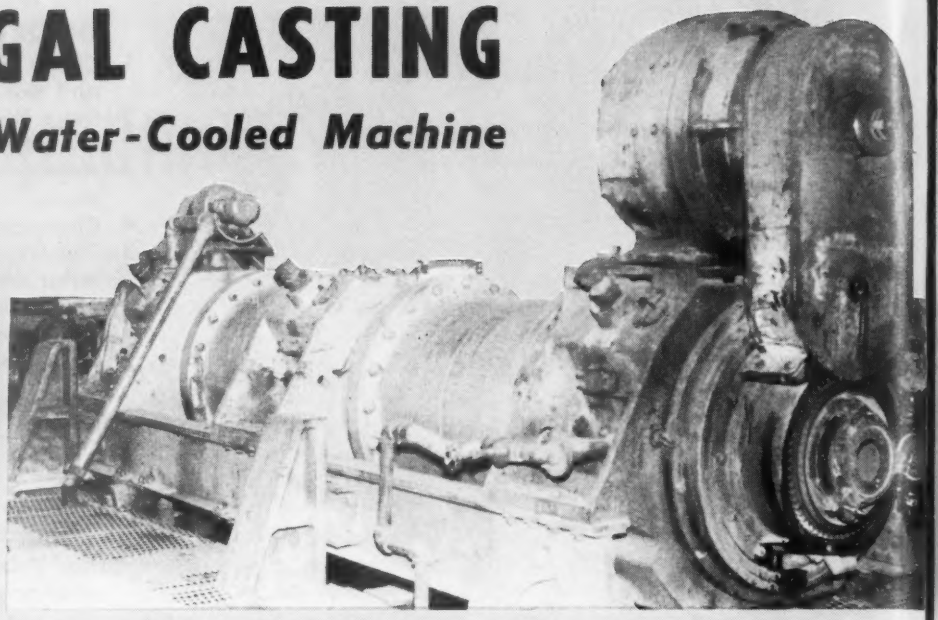

Fig. 1—View of driving end of German casting machine shows some of the construction details

SINCE the initial realization in the 1920's by Col. Tracy Dickson that the hollow cylindrical shape of gun tubes made these components adaptable to production by true centrifugal casting,[1,2] Watertown Arsenal has pioneered in this field.

Consistent improvement and refinements were obtained through the years. Even though the process was developed so that it contributed substantial production during World War II and the Korean emergency, this development work to improve the quality of the tubes and economics of the process continues.

At the end of World War II, it was known that Germany also utilized the centrifugal casting process for large-scale gun tube manufacture. A brief description of the type of machine and technique employed for some of these centrifugally cast tubes is contained in the technical literature.[3,4] To evaluate the German machine and study the casting technique, a water-cooled machine was obtained from Germany for shipment to Watertown Arsenal. Considerable work was required to place the unit in operation because of incomplete equipment, different electric voltage on electric motors, and metric dimensions. It was also necessary to install several safety features to comply with U. S. standards. Eventually, however, the machine was assembled on a specially prepared foundation.

Machine Construction—The German casting machine employs a horizontal axis, thin-walled steel mold rotating in a water jacket. Design details are best shown by the sketch in Fig. 2. The mold is driven through a system of herringbone gears by a 125-hp, dc motor located at the nonpouring end. Cooling water is supplied to the jacket from a pipe located at the bottom of the driving end and flows out two overflow pipes at the pouring end. The water is sealed in the jacket by rubber gaskets bearing on the rotating mold at each end. The machine can be tilted from the horizontal by means of two hydraulic pistons that raise the pouring end about a pivot at the non-pouring end.

Some details of construction are shown in Fig. 1, taken near the driving end, and Fig. 3, showing the pouring end of the machine. The longitudinal thrust is absorbed by the wheel contacting the driven end of the mold, shown at the extreme right of Fig. 1. The pouring basin and stand, which is attached to the casting machine base, are demonstrated in Fig. 3. This latter arrangement is such that the relative location of the pouring basin and mold are not affected when the machine is tilted.

The machine consists of three operating sections containing four adjustable rollers each for supporting the mold within the water jacket. Two spacers are located in the water jacket between these operating sections, and the length of these housings can be varied to produce tubes of different lengths. A thin, dry, silica sand lining without any bonding agent is placed on the steel mold surface before pouring by means of the sand tube or trough shown in Fig. 4.

A comparison of the German and the conventional Watertown casting machine (shown in the sectional view in Fig. 5) is of considerable interest. The Watertown machine utilizes a very heavy, air-cooled cast iron chill mold supported in a heavy steel rotor; the German machine employs a light, steel, water-cooled mold directly supported by rollers. A dry sand lining is used on the foreign equipment, whereas the American machine utilizes only a superficial clay wash at the pouring end of the mold. The metal is poured into the smaller end of

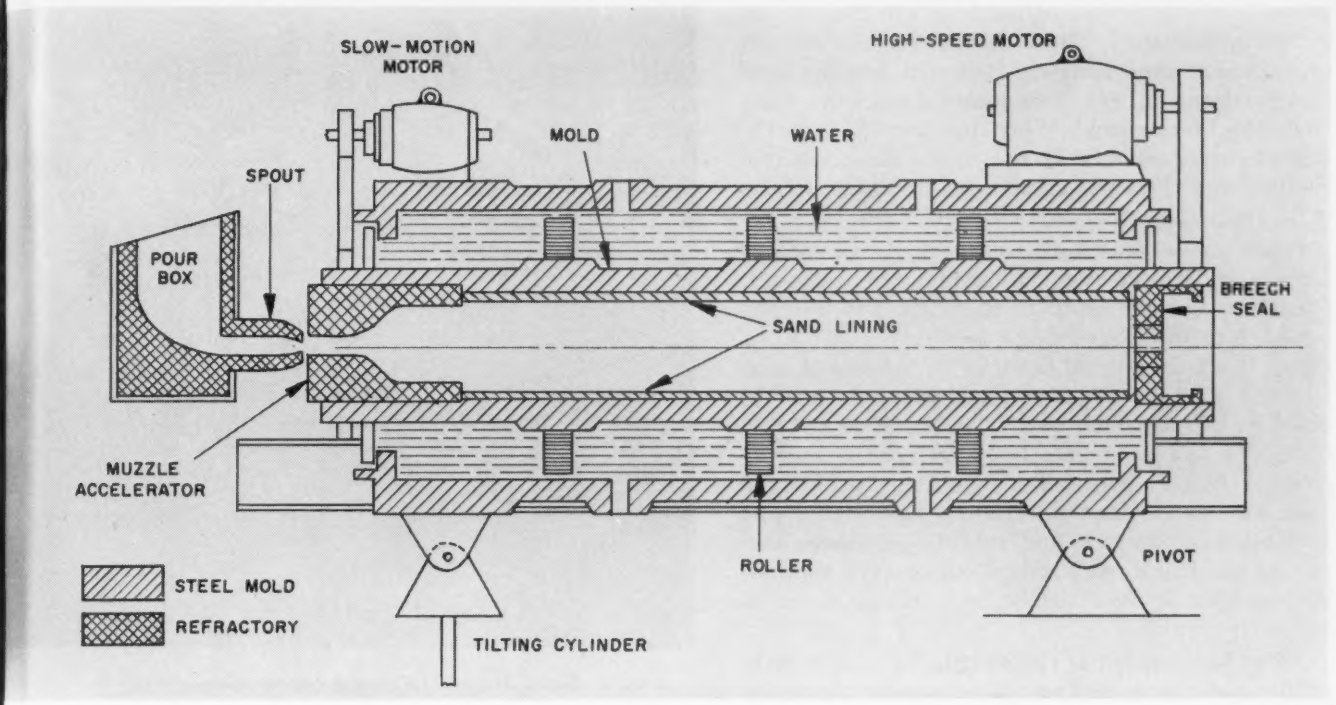

Fig. 2—Sketch shows design details. Mold is driven through a system of herringbone gears by a 125-hp, direct-current motor which is located at the nonpouring end

the German machine and into the larger or breech end of the U. S. model. Longitudinal pressure is applied to the muzzle end of the American machine during the casting and solidification cycle to eliminate transverse hot tearing, but this arrangement is not usually employed on the German equipment.

Experimental Operation—Determination of the value of a centrifugal casting machine can only be assessed by experimental operation. Performance can best be measured by the quality of the tube, production rate of machine, and cost of the operation and accessories. The true centrifugal casting process has the advantage of producing tubes rapidly, close to final dimensions and without segregation, blowholes and shrinkage when a closed metal mold is utilized. The labor, number of processing operations and floor space requirements are all low for centrifugal castings. This process enjoys an excellent economic position with competing forging methods for the production of thick-walled steel tubes, provided a satisfactory manufacturing technique is developed to assure the continual production of acceptable tubes.

When difficulties were experienced with the centrifugal casting process, it was the result of the frequent occurrence of rejectable defects—principally hot tears and laps. The hot tears occur on the outside of the casting in both a longitudinal and transverse direction. Longitudinal hot tears have been shown[5] to be caused by the rupture of the outer skin of the casting by centrifugal pressure. Transverse hot tears result when the tube is not entirely free to contract longitudinally as it shrinks during solidification and cooling. Laps or cold shuts result from the failure of successive layers or waves of molten steel to fuse completely to the preceding layer of metal deposited.[6] As previously shown[6], the development of a satisfactory technique requires a pouring rate and speed of rotation high enough to avoid laps but not so high that longitudinal hot tears are produced. In some casting machines for thick-walled steel tubes, there is only a very narrow range of speed of rotation and rate of pour in which satisfactory tubes can be cast.

The mechanics of operation of the German centrifugal casting are similar to other true, horizontal axis machines. The refractory muzzle accelerator and breech seal are located and fastened in position as shown in Fig. 2. The hole in both accelerator and seal must be concentric with the center of rotation of the mold. The pouring basin with attached

Fig. 3—View of pouring end of machine showing pouring basin and stand, attached to the base

spout (see Fig. 3) is aligned with the hole in the muzzle accelerator. Then the machine is rotated to a speed of approximately 1000 rpm, and the sand trough shown in Fig. 4 is inserted into the mold from the breech end. When the tray is properly aligned longitudinally in the mold, the trough is rotated, and the loose sand coats the inside of the mold under the action of centrifugal force.

When the thickness of sand desired exceeds the capacity of the tray, it is withdrawn, reloaded, placed in position again in the mold and dumped until the required sand depth is obtained. After the lining has been placed, the hole in the breech seal is filled with a cast iron plug, which is held in place by a centrifugal lock. The machine is tilted if desired, and molten steel poured into the pouring basin from a lip-pour ladle. Steel can be obtained from any source that will assure high quality and controlled composition and weight. A closely controlled and measured pouring temperature approximately 150° F over the liquidus of the metal is generally employed.

After the pouring is completed, the tube is spun until completely solidified. The valve on the water cooling line is adjusted to keep the exit water temperature below 100° F through the run. When the machine comes to rest, the muzzle accelerator is removed and the tube stripped from the mold by a pneumatic-hydraulic ram located at the small end. To avoid flaking, the tube is then cooled slowly to below 300° F in cinders before further processing.

The machine has been operated experimentally to produce two types of tubes to date. The first casting was relatively short, with a large bore, approximately 9¾ in. outside diameter tapering uniformly to 7 in., a 2¾-in. bore, and a length of 110 in. These tubes were produced in an existing German mold, utilizing German accessories. The second tube was for a specific application with a 10 to 6-in. OD, 1½-in. ID and 200-in. length. In this case, it was necessary to lengthen the machine and to manufacture a new mold and new accessories.

The results obtained in casting the shorter German tube were generally very satisfactory. The reported German practice was followed as closely as feasible. Twenty tubes were manufactured and the majority were acceptable. Some difficulty was experienced with metal finning between the muzzle accelerator and mold. When this occurred, a transverse hot tear resulted about the midlength of the casting. Investigation of methods to correct this occasional difficulty revealed that while graphite or fire clay pastes applied to the face of the accelerator may have helped slightly, the most important requirement was that the sand tube be located far enough toward the pouring end so that the crack between the mold and accelerator was filled with dry sand. Fig. 6 shows the red-hot casting after its extraction from the mold. Some of the tubes were finished by normalizing, rough machine and heat treating.

Serious difficulty was encountered, however, in the satisfactory casting of the longer, thinner castings in the German machine. The shape of these tubes resulted in considerable susceptibility to transverse hot tears. During the first period of operation a very large percentage of the tubes produced in this equipment exhibited a transverse hot tear at midlength and occasionally longitudinal hot tears were encountered. It was necessary to operate this machine experimentally to develop an acceptable casting technique as described in the succeeding paragraphs.

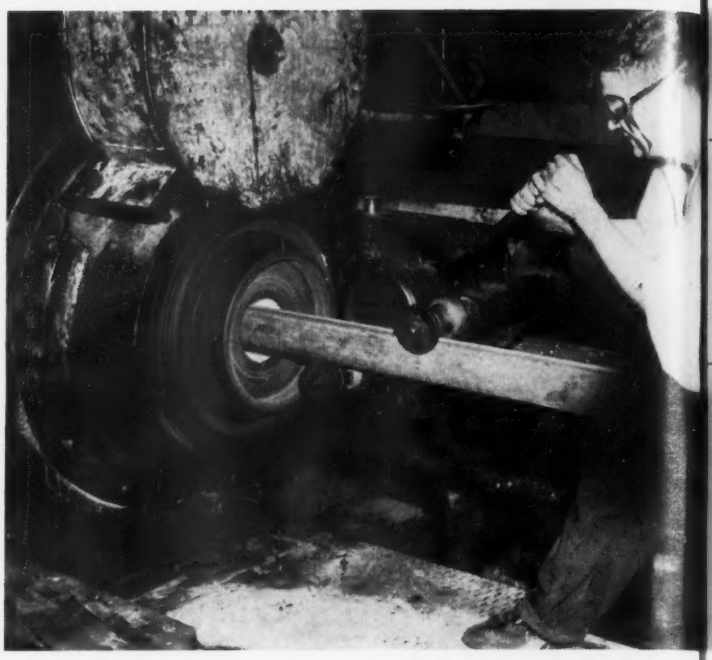

Fig. 4—Sand trough is inserted into mold from breech end as machine rotates at about 1000 rpm

Since force is applied at the smaller end of the solidifying tube to prevent transverse hot tears in the standard Watertown practice,[6] the first attempt to avoid these cracks was the application of longitudinal pressure to the casting. The presence of the accelerator and pouring of the tube from the smaller end of the German machine seriously impaired the feasibility of a pressure application at this end, so an attempt was made to force the tube into the taper by pressure from the nonpouring, larger end. The pressure, however, could not be directed properly because of serious mechanical difficulties, and the incidence of transverse hot tears was not reduced.

The technique was then modified to increase the amount and type of sand lining. The normal practice for the German tube had been to apply a ⅛-in. dry silica sand coating to the mold. This was first increased to 3/16-in. depth by blowing sand into the mold by air pressure. This method reduced the incidence of transverse hot tears but the equipment was awkward to manage. Accordingly, the sand tube was again used and dumped a second time inside the mold to obtain the desired 3/16-in. thickness. While this additional sand reduced the cracks to some extent, transverse and longitudinal tears still occurred.

The sand layer was then increased to ¼-in. depth, and the type of sand changed from New Jersey washed, screened, and dried silica sand to a coarser

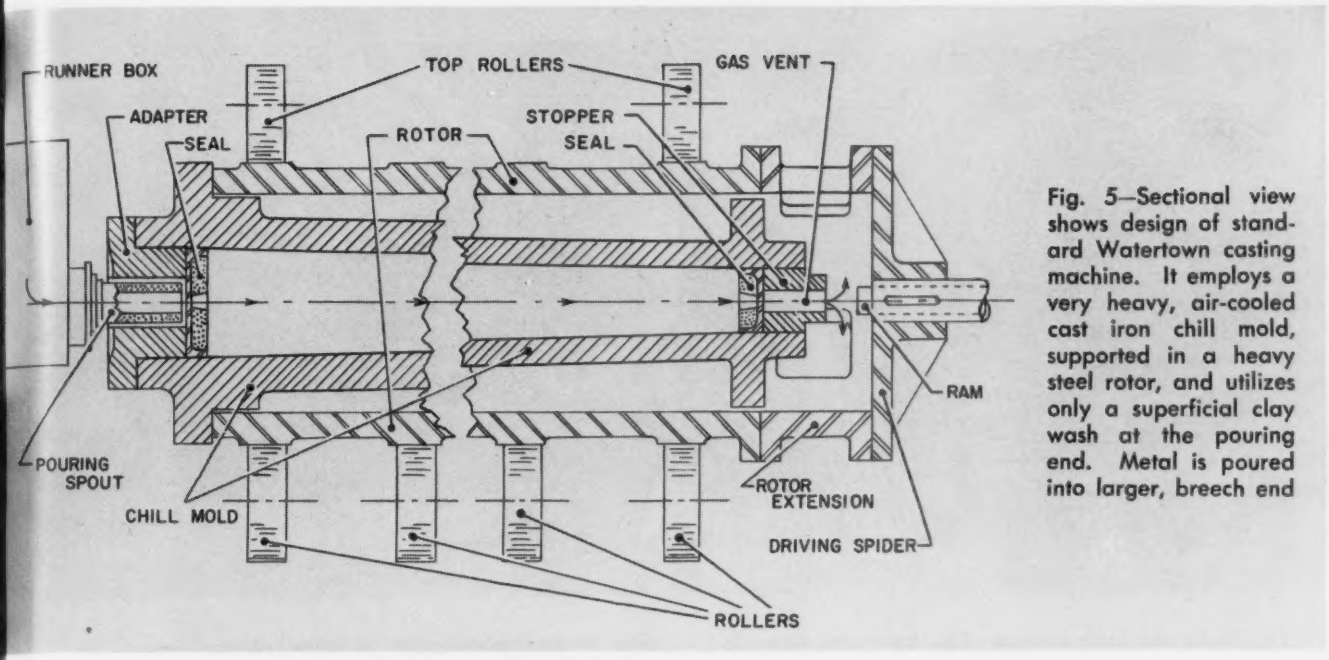

Fig. 5—Sectional view shows design of standard Watertown casting machine. It employs a very heavy, air-cooled cast iron chill mold, supported in a heavy steel rotor, and utilizes only a superficial clay wash at the pouring end. Metal is poured into larger, breech end

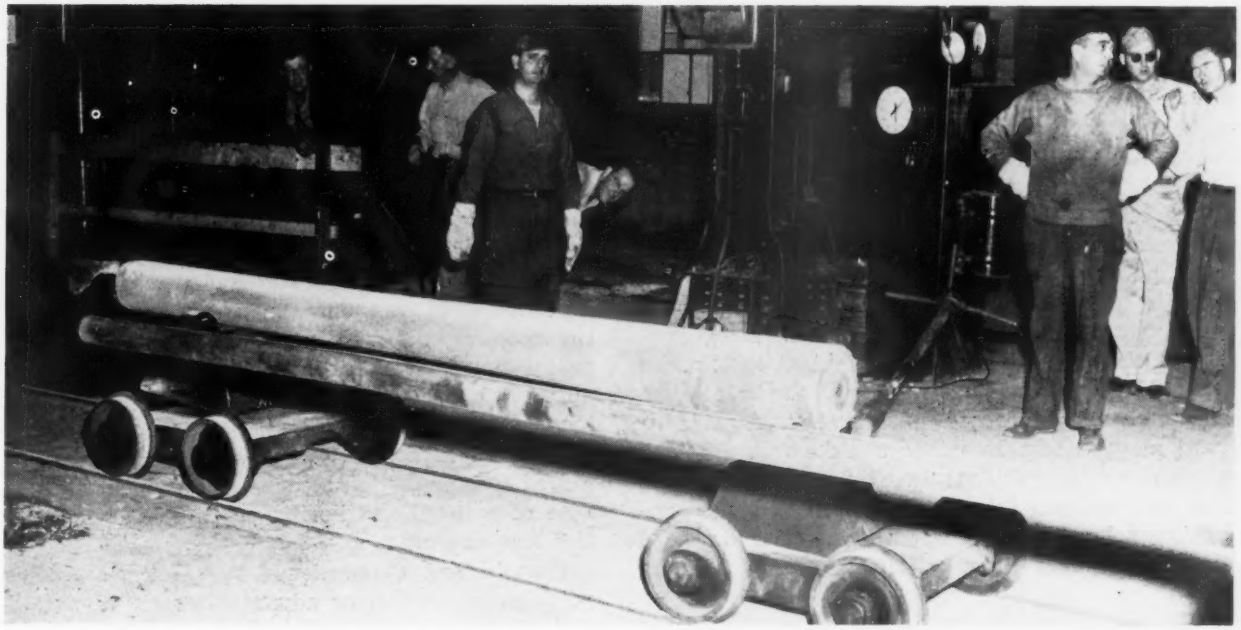

Fig. 6—View shows a red-hot casting after it has been extracted from the mold. Some of the tubes were finished by normalizing, rough machining, heat treating

Pennsylvania silica glass sand. The ¼-in. thickness of Pennsylvania sand produced the desired results. Several acceptable tubes were finished by normalizing, tempering and rough machining operations and found to be free of defects.

The problem of erosion of the sand lining and penetration of the sand into the casting was investigated. Metallographic investigation has indicated that the sand penetrates into the casting for a depth of approximately 0.1-in. along the casting and to a somewhat greater extent near the pouring end. This is demonstrated by the as-cast macroetched disks shown in Fig. 7 and the photomicrograph taken at the edge of the penetrated layer in Fig. 8. No evidence of sand penetration was found beyond this surface layer. The sand in this layer was removed without difficulty during the processing of the tube by scaling during normalizing and rough machining operations. Normal wear was experienced on the carbide tips used for rough turning the tubes, provided the tip of the cutter extended under the sand layer. An attempt was made to reduce the penetration of the steel into the sand by using a fine zircon sand for the lining. While this material did reduce penetration markedly because of its greater density and higher fusion temperature, the higher heat conductivity and heat capacity produced very severe longitudinal and transverse hot tears.

Irregularities in the sand lining frequently caused depressions on the surface of the cast tube, as shown in Fig. 9. These depressions are unde-

Fig. 7—As-cast macroetched disks show sand penetration into casting for approximately 0.1-in.

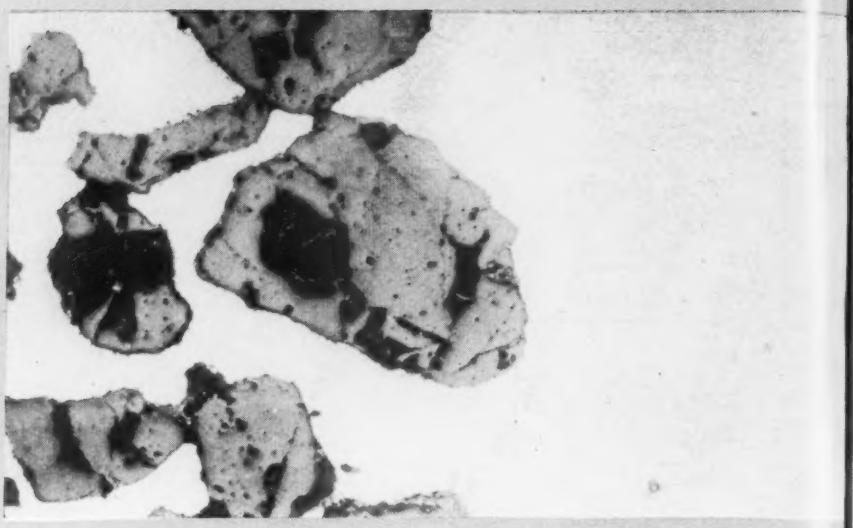

Fig. 8—Photomicrograph at edge of penetrated layer shows no penetration beyond 0.1 in. X100

sirable because they reduce the machining finish at that location and produce a variation in the heat flow, thereby increasing susceptibility to casting cracks. The cause of these irregularities was investigated while the mold was rotating by stroboscopic examination of the sand lining. A high-speed photograph of this lining when the mold was rotating at 1000 rpm is shown for both the pouring and driving end of the mold in Fig. 10. Irregularities of the sand surface are evident at the muzzle or pouring end; the sand surface at the breech end is considerably smoother. It was shown by this investigation that a smoother surface was obtained when the sand was deposited by a single dump of the sand trough. Further study revealed that serious irregularities would result if the tube contacted the sand surface when withdrawn after the lining deposition.

The refractory accelerator serves two important functions in the German machine. First, this tapered sleeve must bring the metal up to a sufficiently high speed to prevent raining inside the mold and to spread the molten steel as a smooth envelope over the sand layer. Second, the accelerator must produce a transverse hot tear at the small end of the tube to permit freedom of longitudinal contraction and facilitate removal of the casting from the mold. The accelerator usually performs these functions satisfactorily. High-speed movies taken from the larger end of the mold as molten steel was poured into the sleeve at 1000 rpm showed that the molten metal accelerated to 890 rpm in about 1½ seconds. The leading edge of molten metal had left the sleeve and progressed about 1 ft down the mold in this 1½ seconds.

Experimental work was conducted with various shapes of accelerators to determine any variation in performance resulting from increasing the diameter against the mold face. Different sizes and types functioned satisfactorily, provided no fin of metal was obtained between the mold and the front face of the sleeve. The transverse hot tear is caused within the refractory sleeve by the higher susceptibility of the hot steel at this location to tears, compared to the colder body of the tube solidifying against the water-cooled mold.

Molten steel was poured into the machine when the mold was tilted 10 degrees down from the horizontal for several tubes. This modification was apparently made primarily to increase the rate of longitudinal metal distribution in the mold. No significant difference was observed in the time required for the molten steel to spread over the surface of a tilted and horizontal mold so this practice was discontinued.

Results and Conclusions—The German casting machine exhibits some advantages over the standard Watertown machine. These advantages are:

1. The rate of pouring molten steel into the mold can be increased without longitudinal hot tearing because of the improved longitudinal metal distribution in the mold. The refractory sleeve accelerates the molten metal to the rotational speed of mold rapidly, and pouring from the smaller end causes the metal to flow toward the larger end under centrifugal force.

2. The depth of cold shuts or laps is reduced by the more rapid metal distribution and pouring and by the insulating effect of the thin sand lining. Consequently, a smaller diameter cast tube can be produced for a given product, with resulting savings in steel and machining.

3. The production rate of the machine is considerably higher, since the mold is continually cooled by water and can be fitted for casting as soon as a tube is removed. This results in increased productivity of the machine operations.

4. The cost of machine accessories, particularly

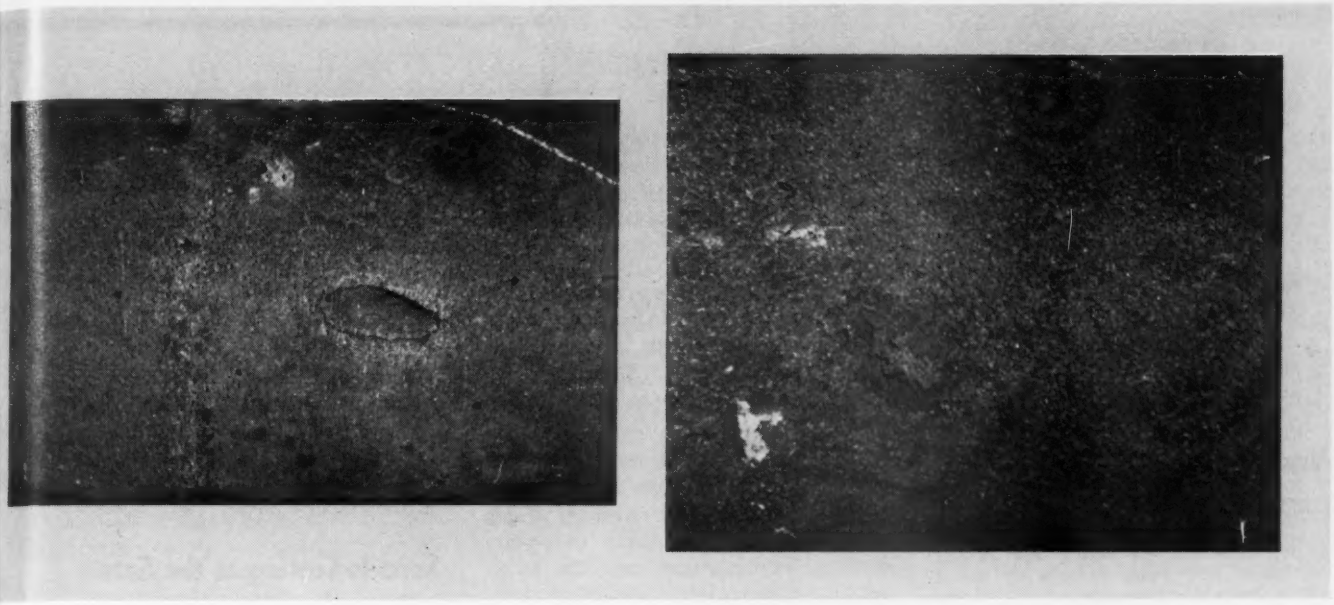

Fig. 9—Irregularities in sand lining frequently caused depressions on surface of cast tubes which reduce machining finish and increase susceptibility to cracking

of the mold, is reduced. The life of the steel mold is not known but the rate of deterioration has been observed to be much less than for the cast iron mold.

Experimental operation has demonstrated that this type of equipment has increased the range of operation in which satisfactory casting can be produced. The combination of improved distribution of molten metal and the insulating effect of the sand lining permits greater latitude in adjusting the pouring rate and spinning speed without encountering longitudinal hot tears or deep laps than was possible with Watertown equipment. Several of the tubes have been completely rough machined and heat treated to determine their comparative quality. Metallographic, mechanical and magnetic particle examination of these tubes has shown the same high quality obtained in conventional centrifugal castings. It must be stressed, however, that the equipment has yet to be tested on a large-scale production program.

Many phases of operation of this German casting equipment remain to be investigated. The capability of the machine in producing large castings and in manufacturing tubes with other than a straight taper will provide valuable information. Future work should also include the investigation of different types of dry lining material such as rutile, chamotte and forsterite, and improved methods of placing this lining.

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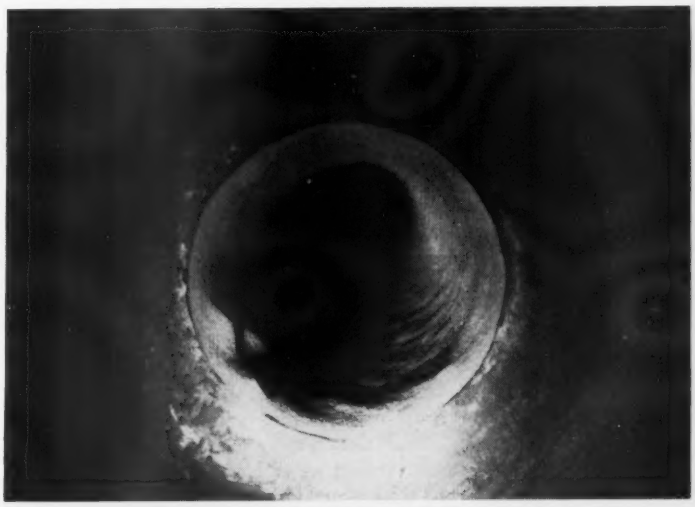
POURING END OF MOLD



DRIVING END OF MOLD

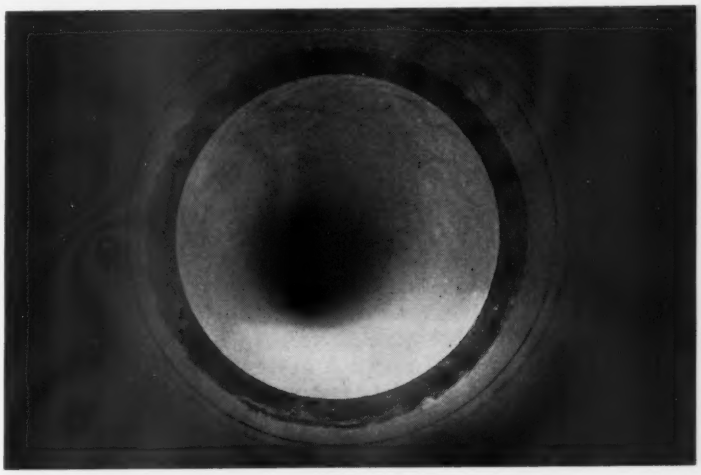


Fig. 10—High-speed photograph of sand lining shows sand surface irregularities at muzzle or pouring end, but sand at breech end is smoother

Questions and Answers

Best procedure for establishing cost system is to set up itemized accounts of all phases relating to producing and selling castings . . . Pinholes under casting skin result from gas in metal . . . Weak sand may cut . . . Wants high conductivity in castings . . . Describes method for making copper tuyeres

Wants Information on Costing

QUESTION We have been operating a gray iron foundry in the Great Plains area for 65 years but as yet we have not come up with what might be called a perfect plan for determining cost, and we wonder if you have anything of this kind in book or other form. Do you have any idea what the average foundry costs are at the spout of the cupola or, where a foundry makes many different items, what the average cost per pound is? Also what is the best method? Is it better to take an average cost when you are making different items or is it better to take the cost on each item at the spout plus labor and overhead? Also what do they figure as being an average overhead percentage to take on the final cost arrived at?

ANSWER Over a period of years a number of articles have appeared which discuss sound methods of ascertaining costs in foundries. In addition, the Gray Iron Founders' Society has a cost manual which recently was revised, and may be obtained for $15. We recommend that you secure a copy of this, and use it for the basis for establishing your cost system. Since the manual describes the detail involved, we will touch only briefly on your questions.

First, average melting cost or cost per pound at the cupola spout. Even if this figure were available, it might be misleading because no two foundries operate exactly alike—not to mention differences in equipment, labor costs, raw material costs, etc. Best procedure is to set up itemized costs for every factor affecting melting, such as metal, coke and other fuels, labor supervision, supplies such as refractories, etc., repairs, overhead such as power and light, depreciation of equipment and building, taxes, etc. These will show the cost of melting a pound of iron, and indicate where possible changes would result in lower cost.

The answer to your second question on use of average costs is that every casting should stand on its own feet costwise. Obviously there is a differential between the cost of plain work and that of cored castings which widens as intricacy of coring increases. If average costs are used, it means that the plain casting is overpriced and the cored casting underpriced.

Your last question on average overhead percentage is not quite clear. Possibly you are referring to labor overhead, often called the burden. That is a percentage based on dividing the total overhead of a department by direct labor cost.

Pin Holes Show up Under Skin

QUESTION We are enclosing a section from the runner used in making nickel siver bronze castings which shows the trouble we are having—pinholes just under the skin. This condition occurs in both cope and drag portions of the castings. Molds are made of No. 00 Albany sand, using a 1-in. sprue into the runner in the cope, and into the risers. We think that this condition may be due to low permeability and too large a sprue.

ANSWER The small piece of runner forwarded for examination makes it difficult to determine whether the holes just under the surface are caused by lack of permeability and too large a sprue, as you mention, or by imperfect degassing. The only way to determine the exact cause is by process of elimination.

Since the specimen's exterior surface does not show definitely that the source is mold gas, we suggest looking at your deoxidation and degasification procedure. Usual method is to add per 100 lb of alloy 4 oz manganese-copper, 1 oz stick magnesium and 3 oz phosphor-copper (15 per cent P) about 5 minutes before pulling the crucible from the furnace. However, before pulling the pot we suggest you pour a test plug about 1½ in. in diam and 3 in. long, and observe whether or not it shrinks or pipes properly. If it does not, make another addition of the deoxidizing and degasifying materials.

If the metal appears all right, and the holes persist, then study the sprue and sand. For one thing see that in pouring, the crucible lip is as close to the sprue opening as possible to prevent inspiration of air. If you think the sprue is too large, try choking it at the bottom by reducing the diameter, or if that is not easily done, choke at the junction of sprue and runner. If the sand is too "tight" —lacks permeability—we believe it is better to try a coarser grade than to try to "open" up your present sand. Considerable experimental work is required to obtain satisfactory results in the latter case.

Sand Is Cutting at the Gate

QUESTION We have run into difficulty with the lids or covers we make for coal and wood stoves. The sand seems to be cutting at the gates, and if we pour with cooler iron it will not run through the tins used to form the pocket for the lifter. Hot iron cuts the sand at the gate and carries it on to the face of the lid. We have tried two types of gates along the rim or edge without success. The natural sand used gives satisfactory results on the remainder of our stove work.

ANSWER It appears to us that your sand is on the "weak" side; that is, it lacks sufficient bond to resist the flow of the metal stream. We suggest you take a small batch, add a small amount of clay or bentonite and observe the results obtained. Then proceed accordingly. However, since the sand seems to operate satisfactorily for other castings, a change in gating may solve the problem, and we recommend that you try the wedge gate commonly employed in stoveplate molding.

Mold the lids face down and attach a vertical gate in the center of the underside. The gate may be 4 in. long and ⅛-in. thick where it is attached to the lid, and tapered up to ¾-in. wide at the top. Pour the castings hard and quick. A sharp blow from a hammer should remove the gate from the lid, leaving only a trace of the attachment.

High Conductivity in Copper

QUESTION In the May issue under the Questions and Answers department reference was made to conductivity in copper castings. We note that the inquirer was getting solid castings with a conductivity of 90 per cent, and the analysis shows 99.90 per cent copper and 0.003 per cent aluminum. We would like to know what is being used to deoxidize the copper to get solid castings. We are using 3 per cent zinc and 97 per cent electrolytic copper and the con-

ductivity runs 75 to 85 per cent, which satisfies the customer, but we are interested in obtaining a higher conductivity.

ANSWER High conductivity may be obtained in pure copper castings as you indicate by suitable degasification or deoxidation procedures. In the particular item referred to the material used was calcium boride, and the amount given was about 6 oz for a 280-lb charge. Same results can be obtained with metallic lithium, using about 0.02 per cent. Those materials are available in sealed copper tubes containing definite amounts of the agents, and for effective results the materials must be plunged beneath the surface of the molten copper and held there until reactions are completed.

Also it is advisable to pour a test plug about 1½ in. in diam and 3 in. long and observe whether or not the top shrinks or pipes. If it does not, then a second addition of the material should be made since suitably deoxidized or degasified copper and its alloys shows a definite shrink.

Making Copper Tuyere Casting

QUESTION We operate a foundry in Colombia and have need to make some cast copper tuyeres for blast furnace work. Can you give us information on the best molding and core procedure, etc. Also information on melting, degasifying and pouring of the copper. We are thinking of using calcium boride as a degasifier, and wonder if that will be all right.

ANSWER Blast furnace tuyeres are made in a variety of ways. These include use of dry sand and green sand molds, molding with the big end up with the chamber or jacket core suspended from the cope or supported by chaplets in the bottom, or all in the cope, big end down resting on the water inlet cores and wiring through the bottom.

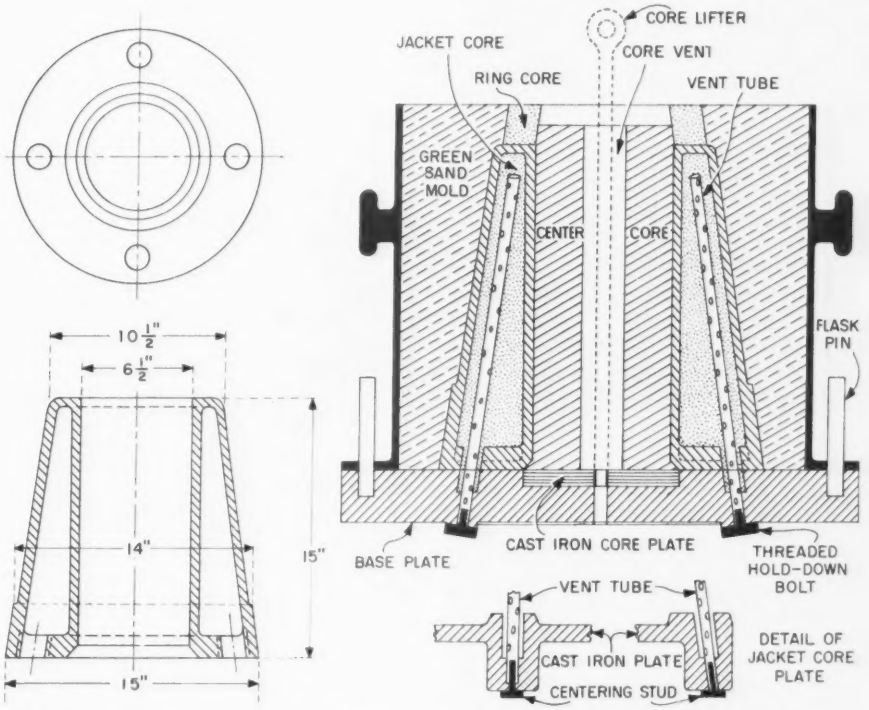
However, one of the best methods we believe is that described some years ago. In this the casting is molded and poured big end down. Entire body is in a one-piece cast iron flask. Drag is formed by a cast iron plate ribbed on the bottom to provide strength and rigidity. Face is machined to a true plane and carries a small gate channel from one corner to a point near the print for the center core as well as holes accurately drilled for the core prints and flask guide pins.

Hole for center core print is ¾-in. deep with slightly tapered sides to receive a round iron plate of the same conformation on which the center core is rammed in a separate box. Similar print in the corebox insures proper location of the core. Center core is green type made from a mixture of new and old molding sands to provide a "strong" sand. A vent hole 2 in. in diam in the center of the core carries away any gases. After making, the core and supporting plate are lifted by a suitable eye-bar, set in the print on the drag plate, and the bar removed.

Jacket or chamber core is made on a jolt machine using a cast iron ring plate both as a support for handling until after it is baked as well as for proper location of the vent tubes and formation of the water inlets. As indicated in the lower part of the accompanying sketch, the vent tubes are located in pockets in the plates on studs to hold them in the proper position. The pockets also form the water inlets or projections on the core. Vent tubes are ⅝-in. in diam and pierced with numerous small holes. Bottom portion is threaded on the inside for fastening with bolts when placed on the drag plate. Core usually is made of half coarse bank (low clay) sand and half silica sand, and bonded with pine resin (colophony) binder, but there is no reason that it cannot be made with core oil and cereal. After the core is baked it is removed from the supporting ring, set in place on the drag and bolted down firmly.

Drag plate, as indicated earlier, contains holes for the reception of the center core supporting plate and a portion of the water inlet cores. Latter holes are about 1 in. deep and, of course, of the same diameter of the core. Remainder of the hole through the plate is ⅝-in. diam to receive the end of the vent tube. Drag plates are elevated about 18 in. above the floor on steel framework to provide access for bolting the core in place. Cope is made in green sand in a square flask, and the center core is held down with a ring core tapered slightly on inside and outside diameters.

Copper usually is melted under *dry*, dust-free charcoal which is placed on top of the cold metal charge, and raised to around 2300°F as rapidly as possible. Calcium boride is suitable for degassing; it is added just before pulling the pot. After adding the degasifier, it is preferable to pour a test plug 1½ in. in diam and 3 in. long, and observe whether it shrinks or pipes properly. If not, more degasifier should be added. Best pouring temperature will have to be determined by experiment; you might try 2150°F as a starting point.



Sketch showing various features employed in producing copper tuyeres

May Be Using Too Much Binder

QUESTION In our foundry in India we are experiencing core blows in some of the impellers we are making in gray and alloy cast irons. We have tried various core mixtures containing silica sand bonded with 4 per cent dextrine, 2 per cent double-boiled linseed oil and molasses without success. Can you suggest a core mixture which practically will evolve no gases or, if they occur, they will not cause a blow? Thickness of the cores at the vanes is ⅛ to ⅜-in.

ANSWER Since all the commonly used core binders generate gases, the way to overcome the difficulty is to use as little binder as possible. Also, the sand mix after baking should have a reasonable amount of permeability, and where possible the core should contain vents to carry the gases outside the mold.

In your case you are using three binding agents; we believe you should eliminate the molasses and reduce the others to the least amount that will serve satisfactorily. You will have to experiment to determine that amount. As a starting point we suggest you try a small mix containing 1.25 per cent oil and 1.0 per cent dextrin by *weight*. Bake and see what results are obtained. This should enable you to determine the direction in which to move. For example, if the cores are too fragile, increase the oil a slight amount; if the mix lacks green strength increase the dextrin.

Wants To Raise Tuyere Height

QUESTION We are operating a 51-in. cupola lined to 42 in. and the distance from the bottom plate to the bottoms of the tuyeres is 10 in. We want to increase the storage capacity of the well by raising the tuyeres and slag hole. In your opinion to what extent may the tuyeres be raised without detrimental effect on our melting rate and metal temperature?

ANSWER Allowing for a separation of around 4 in. between tuyeres and slag hole and 6 in. for the sand bottom in your cupola, it appears at present that the tap hole is open continuously. While we have not seen any comparable figures, the general consensus is that spout temperatures are higher with continuous tap and low bed. Reason for it is that the iron is not cooled by passing through any depth of coke or by being held in the cupola well where heat is lost to some extent. So far as we know, there should not be any difference in melting rate between a cupola tapped continuously and intermittently.

Many foundries use the cupola well as a storage reservoir and have no difficulty in obtaining iron hot enough to pour thin castings. Essential point is to see that the bed coke is thoroughly ignited and the cupola well is well heated before melting takes place. One way to do this is to employ one or more "ignition" holes just even with the top of the sand bed which will admit air to the bottom of the coke bed. The holes later are closed with mud or brick when the bed is burned through properly.

If that practice is followed we see no reason why you cannot raise the tuyeres and slag hole to provide a reservoir of molten metal, and have good, hot iron available. With your 42-in. diameter, 1 in. in height between top of the sand bed and bottom of the slag hole will hold about 180 lb iron, and you should be able to get hot iron with the well 12 in. deep or even deeper.

While you mention raising the tuyeres and slag hole, it appears that it would be better to install a forehearth or mixing ladle at the spout with the desired storage capacity. Such a unit, of course, would have to be preheated thoroughly before filling with the iron, just as in the case of the cupola well. It might be worthwhile to figure out the economics of both procedures.

Describes Molding Procedures

QUESTION Can you give us any information on stack and multiple molding methods, and the equipment used?

ANSWER Stack molding is the term applied to foundry operations where the molds are placed vertically on top of each other with a common sprue supplying molten metal to the casting cavities. The cavities are in one face of the mold, usually the bottom, and the flat face of the preceding mold seals the mold. First mold laid down has the sprue plugged to stop off the metal flow, or a flat back may be used.

Multiple molding is similar except that half of the casting cavity is in the bottom face of the mold and the other half in the top face, so that the top of one mold and the bottom of the succeeding mold are required to form a complete cavity.

Machines used for mold production usually are jolt-squeeze type. In the case of multiple molding a half pattern is mounted on the squeeze head in addition to the half pattern on the platen or table of the machine. Number of molds forming a stack will depend largely upon the depth of the flasks used; the deeper they are, the fewer are needed to bring them to a convenient pouring height.

Must Vent Open-sand Molds

QUESTION We pour some of our castings in open molds but have trouble in that they show many holes in the open face while the other three faces are free from that condition. We are using charges composed of 300 lb No. 2 foundry pig, 500 lb whole motor blocks, and 800 lb cupola cast scrap. Over iron poured on the floor does not show the holes.

ANSWER While pouring in open sand molds eliminates the work of producing the cope, and any trouble from cope defects, the method still requires suitable venting if satisfactory castings are expected. Gases generated by contact of molten metal with moist sand must escape to the atmosphere; and if they cannot, they will try to pass through the metal. In your case it appears that you will have to locate the bottom face of the mold over a cinder or other permeable bed which in turn is vented to the atmosphere by vertical tubes or pipes.

Coring Small Holes Difficult

QUESTION Can you offer any suggestions for coring approximately 8000 holes 3/16-in. in diam in the ribbed, tapered shell liner casting for paper making shown in the accompanying drawing. Material is cast iron and the liner is slightly over 32⅝ in. long, 24¼ in. in diam at the large end and 15 in. in diam at the small end. It has 20 ribs about ¾-in. deep on the interior, and each rib is to contain 400 holes. At present we are drilling 5/32-in. holes from the outside but would like to core them 1 in. deep with 3/16-in.-diam holes from the inside, but not all the way through. We have been informed that it is not practical to core these holes due to washing or burning-in as well as the problem of making, setting and removing them.

ANSWER We agree that the idea of coring out the holes in the shell liner casting lacks practicality. Making and setting such a large number of small cores would involve considerable expense since the work would have to be accurate to obtain any benefit. Also, consideration must be given to the fragility of such small cores as well as the possibility of burning-in or washing when they come in contact with molten metal.

If it were not for the decided chilling effect on gray iron, use of a high-alloy cast iron for the cores might eliminate problems of fragility, burning-in, washing and later removal. The material, containing 14 per cent Ni and 6 per cent Cu, expands somewhat more than gray iron under the same temperature conditions, and can be removed without difficulty when casting is cold.

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A typical Iroquois product . . . a marine motor housing.

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Says Mr. Walter Vierthaler, Vice-President of Iroquois Foundry Co., Racine, Wisconsin, where high quality grey iron castings are produced. Here approximately 300 tons of mulled sand are conditioned each night with a Royer NYP-E Sand Separator & Blender.

Front end loaders deliver the sand from the muller to the molding station. The original practice was to dump this sand on the molders heap, caked and packed from mulling and bucket loading. Now the sand is charged into the large hopper of The Royer instead. No time has been added to the cycle of operation, but the molders heap has been transformed to a cool fluffy pile. When one floor is completed, the highly portable Royer is moved to the next. Scrap loss and cleaning room time are down and casting finish has been improved.

All mulled sand can be vastly improved by proper aeration and fluffing. The best place for this operation is at the molding station where the sand will not be compacted by further handling prior to the molding operation. For a bucket loader type of operation we recommend the new Royer NY series. Write for bulletin NY-54 today.

Foremost in Sand ROYER *Conditioning Equipment*

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MEN . . . of Industry

CARL L. LIEBAU
. . . pres., Federal Malleable

NORMAN N. AMRHEIN
. . . Federal Malleable v. p.

GEORGE E. O'BRIEN
. . . becomes foundry manager

HOWARD C. GOLLMAR
. . . Elyria Foundry pres.

CARL L. LIEBAU was recently elected president, Federal Malleable Co., West Allis, Wis., succeeding the late W. H. Heatley. **Norman N. Amrhein** was named vice president-secretary. Mr. Liebau, who will also serve as treasurer, became vice president in 1934 and executive vice president in 1945. During the past year he served as vice president of the Malleable Founders' Society. Mr. Amrhein joined the company in 1940, was named assistant general manager-secretary in 1945 and secretary-treasurer in 1952.

Dr. Moyer D. Thomas of Stanford Research Institute was the first recipient of the Frank A. Chambers Award, presented recently by the Air Pollution Control Association, Pittsburgh, in recognition of his work in development of a recording instrument for analysis and measurement of sulphur dioxide in the air. Dr. Thomas joined the institute last year after 29 years with American Smelting & Refining Co., Salt Lake City, Utah.

Dr. Donald J. McPherson has been appointed assistant manager of the metals research department, Armour Research Foundation, Illinois Institute of Technology. Dr. McPherson joined the foundation in 1950 and until recently was supervisor of nonferrous metals.

Paul A. Mori, since 1940 superintendent, the Cleveland Quarries Co., Amherst, O., was elected vice president-operations. Mr. Mori, with the company for 42 years, became a director in March.

George E. O'Brien, for the past year factory manager at the Uniontown, Pa., water meter plant, Rockwell Mfg. Co., Pittsburgh, has been transferred to the Brooklyn, N. Y., water meter plant as foundry manager. Mr. O'Brien joined the company in 1934.

Ira R. Abbott Sr., since 1952 assistant to the president and a director, Chamber Bering Quinlan Co., Decatur, Ill., has joined the executive staff, Wagner Malleable Iron Co., Decatur. **William L. Olsen Jr.** has also joined the company and will have duties in the finishing department. Since 1947 Mr. Olsen has been chairman of the department of industry at Millikin University. **George E. Patrick** has been appointed vice president-manufacturing. He joined the company in 1921, became a director in 1941, and was company treasurer since 1947. **W. H. Randolph** has retired after 35 years in the accounting department. He continues as a director of the company.

Paul McClay was appointed assistant vice president, Archer-Daniels-Midland Co., Minneapolis. For the past two years he was in charge of sales for the company's New York office, and will continue to have his headquarters there. Mr. McClay joined the company in 1945.

W. S. Lowe, president, A. P. Green Fire Brick Co., Mexico, Mo., was recently elected president of the Refractories Institute, Pittsburgh. **F. H. Laube,** executive vice president, Freeport Brick Co., Freeport, Pa., was re-elected treasurer.

Howard C. Gollmar, until recently vice president-general manager, Elyria Foundry Division, Industrial Brownhoist Corp., Elyria, O., was elected president of the division. Mr. Gollmar spent two years at National Tube Co., Lorain, O., prior to joining the pattern shop of Elyria Foundry in 1911. He became foreman of that department, assistant foundry manager in 1940 and general manager in 1947. Mr. Gollmar was president of the Northeastern Ohio Chapter of the AFS in 1947-48.

Ford R. Snyder has been elected a vice president, Hickman, Williams & Co., with headquarters in the Chicago home office. He became a director last year. **H. Charles Jones** was named secretary and a director, succeeding **C. H. McNeill,** who retired recently. **Rickman Powers** was made treasurer of the company. Messrs. Jones and Powers are located at the Cincinnati office.

Raymond F. Giffels, secretary-treasurer, Giffels & Vallet Inc., Detroit, recently received a centennial award citation from Michigan State College, honoring his contribution to American life as architect and builder of public and industrial buildings. Mr. Giffels was graduated from the college in 1915.

John K. Light was appointed assistant sales manager, Arcos Corp., with headquarters in the Philadelphia home office of the company. **James A. Brickett Jr.,** formerly salesman in the New England area, has succeeded Mr. Light as district sales manager with headquarters in Boston. Mr.

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MEN OF INDUSTRY

WOODROW HOLDEN
. . . Dostal Foundry plant mgr.

JAMES W. STUART
. . . sales mgr. Tabor Mfg. Co.

FRANK W. GLASER
. . . Alloy Castings v. p.

JOHN W. SWENGEL
. . . assistant works mgr., ACCO

Light first joined the company in 1944 and prior to serving as New England sales manager was field engineer in the research department.

Woodrow Holden is the new plant manager, Dostal Foundry & Machine Co., Pontiac, Mich. For the past 7 years Mr. Holden was associated with Eaton Mfg. Co., Foundry Division, Vassar, Mich., where until recently he was chief metallurgist. Previously he spent over 9 years with General Foundry & Mfg. Co., Flint, Mich. Other connections include Northville Foundry & Mfg. Co., Northville, Mich., and Hillsdale Foundry Co., Hillsdale, Mich. Mr. Holden is immediate past chairman of the Saginaw Valley Chapter of the American Foundrymen's Society and is also active in committee work of the AFS.

Fred P. Biggs was named chairman, Brake Shoe & Castings Division, American Brake Shoe Co., New York. He joined the division in 1916 and has been an officer since 1944. **Stephen S. Conway** has succeeded Mr. Biggs as president of the division and chief executive officer. With the company since 1912, he held various administrative and sales positions with the division since 1929. **John F. Ducey Jr.** takes over Mr. Conway's duties as the division's vice president-sales. A vice president since 1953, he joined the company in 1936 after graduation from Harvard University. **Sam R. Watkins,** formerly executive vice president, National Bearing Division, was named vice president-railroad sales, Brake Shoe & Castings Division. He became associated with the company in 1939 following graduation from Yale University.

James W. Stuart was appointed sales manager, Tabor Mfg. Co., foundry molding machine manufacturing division of Turbo Machine Co., Lansdale, Pa. A graduate of Tri-State College, Mr. Stuart was foundry manager, Product Machine & Foundry Co., Bridgeport, Conn., prior to joining the machine division of Osborn Mfg. Co., Cleveland, in 1951. Until recently he was assistant sales manager for Osborn.

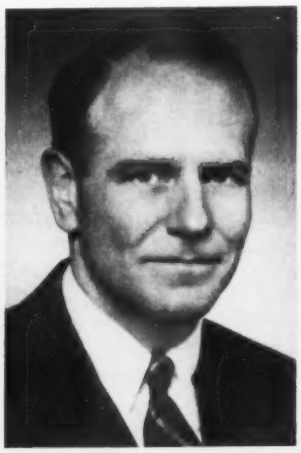
Frank W. Glaser was recently appointed vice president and a director, Alloy Precision Castings Co., Cleveland, in charge of new development, engineering and production operations. A graduate of College of the City of New York and Polytechnic Institute of Brooklyn, he was formerly vice president-research and development, American Electrometal Corp., Yonkers, N. Y.

John W. Swengel, formerly foundry superintendent, was appointed assistant works manager, R-P & C Valve Division, American Chain & Cable Co., Reading, Pa. A graduate of Albright College, Mr. Swengel joined the company in 1937. He left the company in 1947 and was associated with Malleable Iron Fittings Co., Bradford, Conn., until 1952, when he returned to the ACCO organization. Mr. Swengel was recently elected vice president of the Reading Foundrymen's Association.

Benjamin F. Shepherd, chief metallurgist, Ingersoll-Rand Co., Phillipsburg, N. J., recently received an

FRED P. BIGGS
. . . becomes division chairman

STEPHEN S. CONWAY
. . . Brake Shoe division pres.



JOHN F. DUCEY JR.
. . . sales v. p., Brake Shoe

SAM R. WATKINS
. . . railroad sales, Brake Shoe

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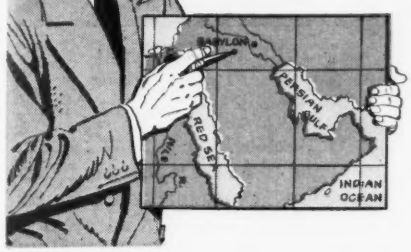
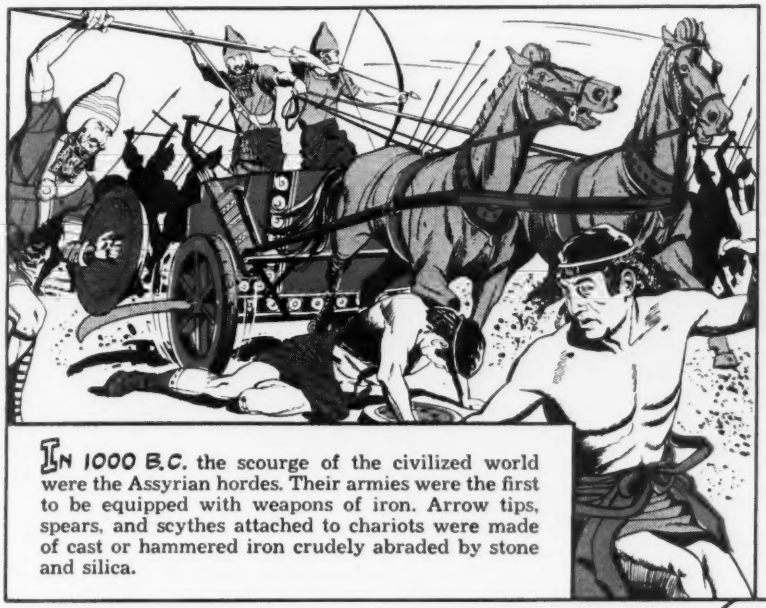


ANCIENT HITTITES discovered iron about 1300 B.C. in what is now Armenia, and began distributing it throughout the Near East. Iron daggers abraded to a smooth finish were the first implements made of the new metal. Perhaps the first instance of iron being mentioned in connection with weapons was a gift of a dagger from the Hittite King Hattusil to his son-in-law, Ramesis II of Egypt.



IN 1000 B.C. the scourge of the civilized world were the Assyrian hordes. Their armies were the first to be equipped with weapons of iron. Arrow tips, spears, and scythes attached to chariots were made of cast or hammered iron crudely abraded by stone and silica.

THE FABLED CITY of Babylon had many masters, but under the Chaldean Emperor Nebuchadnezzar it reached its greatest heights. Abrasion played an important part in finishing and shaping the metal implements of the time; and among the items listed as part of a dowry for a Babylonian maiden were "two grinding stones."

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MEN OF INDUSTRY

CLAUDE B. KERSHNER
. . . director of purchases

ROBERT M. SCOTT
. . . Cincinnati sales, Norton

GERALD H. LUSHER
. . . Norton sales, West Coast

ROY O. SCHIEBEL
. . . Magnaflux sales mgr.

honorary degree from Lafayette College. Mr. Shepherd, who joined the company in 1911, received the American Society for Metals distinguished service award in 1948 for development of the martempering heat treating process.

Claude B. Kershner, since 1951 purchasing agent, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., was appointed director of purchases for the company.

Vernon H. Patterson was appointed manager of foundry sales, and **John F. Robb,** head of steel industry sales, Climax Molybdenum Co., New York. Mr. Patterson, a graduate of University of Rochester, joined the Detroit metallurgical staff of the company in 1949. Previously he was associated with Bausch & Lomb Optical Co. and Engineered Castings Division, American Brake Shoe Co., Rochester, N. Y. Mr. Robb was graduated from Pennsylvania State University and prior to joining Climax in 1935 worked in the metallurgical departments of Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., and Crucible Steel Co. of America, Beaver Falls, Pa.

Hellmuth Walter was named director of research and **Robert S. Sherwood,** assistant director of research, Worthington Corp., Harrison, N. J. Mr. Walter became a consulting engineer at the company's Wellsville Works in 1950 and the following year was transferred to company headquarters in Harrison. Mr. Sherwood joined Worthington in 1951 as a consulting engineer.

Richard C. Crouch was elected president-treasurer, Acme Aluminum Alloys Inc., Dayton, O., succeeding **B. D. Claffey** who resigned the presidency a year ago.

Robert M. Scott was appointed refractories engineer for the Cincinnati area, Norton Co., Worcester, Mass., succeeding **Gerald H. Lusher,** who was transferred to a new West coast sales territory, with headquarters in Los Angeles. Mr. Scott received a master's degree in ceramic engineering from Ohio State University and joined the company in 1953. Mr. Lusher was graduated from Michigan State College and took a master's degree in ceramic engineering from Ohio State University. He was associated with Basic Refractories Inc., Cleveland, prior to joining Norton Co. in 1951.

Frank F. Elliott, since 1952 senior vice president-sales, Crane Co., Chicago, was elected president, succeeding **John L. Holloway,** who resigned because of ill health. Mr. Holloway, who joined the company in 1935, became president in 1946. He will continue with the company as a consultant. Mr. Elliott, with Crane Co. 33 years, was successively manager of the San Francisco branch, western district sales manager and vice president in charge of all branches.

C. Herbert Quick has been appointed assistant to the director of research and development, Norton Co., Worcester, Mass. A graduate of Cornell University, he joined the company's research laboratory in 1924. Previously he was assistant plant superintendent, chief inspector and engineer of ceramic development.

Gordon F. Hubbert has been appointed manager of the Michigan sales district, Catalytic Combustion Corp., Detroit. Mr. Hubbert, who attended Northwestern University, recently was district sales manager in the same territory for Wheelco Instruments Division, Barber-Colman Co., Rockford, Ill.

Roy O. Schiebel, since 1952 eastern district and export manager, Magnaflux Corp., Chicago, was recently named sales manager, succeeding **Lloyd J. Oye,** who has joined Rezolin Inc., Los Angeles. Mr. Schiebel became Los Angeles branch manager for Magnaflux in 1942, after two years in the Chicago office, and in 1945 was appointed Midwest district manager in Chicago. **Robert G. Strother** is the new eastern region manager. **Kermit A. Skele,** formerly Chicago manager, succeeds Mr. Strother as western manager in Los Angeles. **Denis P. Walsh,** until recently assistant to the vice president, has been appointed manager of the Central region, in Chicago.

Everett K. Jenkins was recently the recipient of a meritorious service scroll at the Eastern Seaboard Conference, awarded by the Joint Conference of State Apprenticeship Agencies and the Bureau of Apprenticeship, U. S. Department of Labor. Mr. Jenkins retired last January as assistant director of the department's Bureau of Apprenticeship.

John J. Mlynski was appointed central region sales manager, Industrial Truck Division, Clark Equipment Co., Battle Creek, Mich., with headquarters in Chicago. He was associated with Ross Carrier Co. when it was acquired by Clark two years ago and after serving as a distributor's salesman later became district sales manager on the Clark factory staff.

Pat E. Dougherty was appointed district sales representative in Washington, western Idaho and northwestern Montana for Leschen Wire Rope Division, H. K. Porter Co., New York.

Albert J. Smith, formerly assistant sales manager of the electrode division, the McKay Co., Pittsburgh, has

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  The only insulating firebrick on the market designed for such high temperature service.
- **G-30 FOR TEMPERATURES TO 3000° F.**
  A *true* 3000° F. insulating firebrick . . . precise data recorded in actual service proves it to be the outstanding brick of its type.
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  Can be used in place of normal fire-clay brick with tremendous savings in weight and fuel costs.
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  Unexcelled for use in heat treating and annealing furnaces in which the temperature does not exceed 2300° F.
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been appointed division sales manager. A graduate of University of Pittsburgh, he previously was a metallurgical engineer in the technical service division of the company.

Ernest C. Kron, formerly steel metallurgist, Doehler-Jarvis Division, National Lead Co., New York, was appointed division metallurgist, succeeding **J. C. Fox,** who resigned recently to establish his own consulting firm. Mr Kron was graduated from University of Minnesota and joined Doehler-Jarvis in 1947 after 11 years with Battelle Memorial Institute, Columbus, O., where he became assistant supervisor in charge of research foundry operations. Previously he was associated with Bethlehem Steel Co., Bethlehem, Pa., and Republic Steel Corp., Cleveland.

Milton G. Peck has been appointed vice president and director of sales and advertising, Gar Wood Industries Inc., Wayne, Mich. Mr. Peck has been engaged in industrial truck sales for over 30 years, until recently with Clark Equipment Co., Battle Creek, Mich., and previously with Yale & Towne Mfg. Co., Philadelphia.

William J. Grant, formerly manager of southern sales, National Bearing Division, American Brake Shoe Co., New York, was appointed southern sales manager for railroad products. He will be in charge of sales for the National Bearing, Southern Wheel, and Brake Shoe & Castings Divisions, continuing to be located in Norfolk, Va.

Joseph A. Stott was recently appointed general sales manager, North American Refractories Co., Cleveland. Mr. Stott received his training in ceramics at Pennsylvania State University. He joined North American Refractories in 1929 and was manager of the Philadelphia sales district for the last 15 years.

Earl H. Thomas has been appointed district manager of FOUNDRY in the Ohio territory where he will be associated with A. L. Klingeman, regional manager. He succeeds **James K. Gillam,** who has held the position since 1952 and who has been made district manager in northern Ohio for *Steel*. Mr. Thomas was graduated from Ohio State University and was associated with Goodyear Tire & Rubber Co., Akron, O., and with Sweet's Catalog Service in Cleveland. After one year with *American Exporter*, he joined the advertising sales staff of *Steel* last year.

EARL THOMAS

Harry W. Cyphers Jr. recently joined the Chemical Division, Borden Co., New York, as sales manager of thermosetting synthetic resins and molding compounds, with headquarters in Philadelphia. Mr. Cyphers was formerly associated with American Cyanamid Co., New York, as advertising-sales promotion manager.

A. B. Keckley and **W. M. Ferguson** were elected vice presidents, Texas Electric Steel Casting Co., Houston, Tex. **Thomas H. Shartle Jr.** was named a director. Mr. Keckley, a graduate of University of Texas, joined the company in 1942. He served as comptroller prior to becoming general manager in 1953. Mr. Ferguson was graduated from Rice Institute and was appointed night chemist at Texas Electric Steel Casting Co. in 1937. He worked in production until 1944, when he transferred to the sales department, and was appointed sales manager in 1945. Mr. Shartle worked in the coreroom and standards department during summer vacations and after graduation from Stanford University in 1951, he joined the inspection department. Following Army service he returned to the molding department last year and was later named to a supervisory position.

Robert J. Reynolds, who has been teaching at Agricultural and Mechanical College of Texas, has gone to Pakistan where he will work with Brown & Root Co., Houston, Tex., on the construction and putting into operation of a foundry for the government. Mr. Reynolds has taken an active interest in the AFS student chapter at the college.

Howard F. Kulas Jr. recently joined the sales department, Cleveland Metal Abrasive Co., Cleveland. Mr. Kulas was formerly manager of original equipment manufacturer sales, Weatherhead Corp., Cleveland. Previously he was associated with the Pressed Steel Division, Republic Steel Corp., Cleveland.

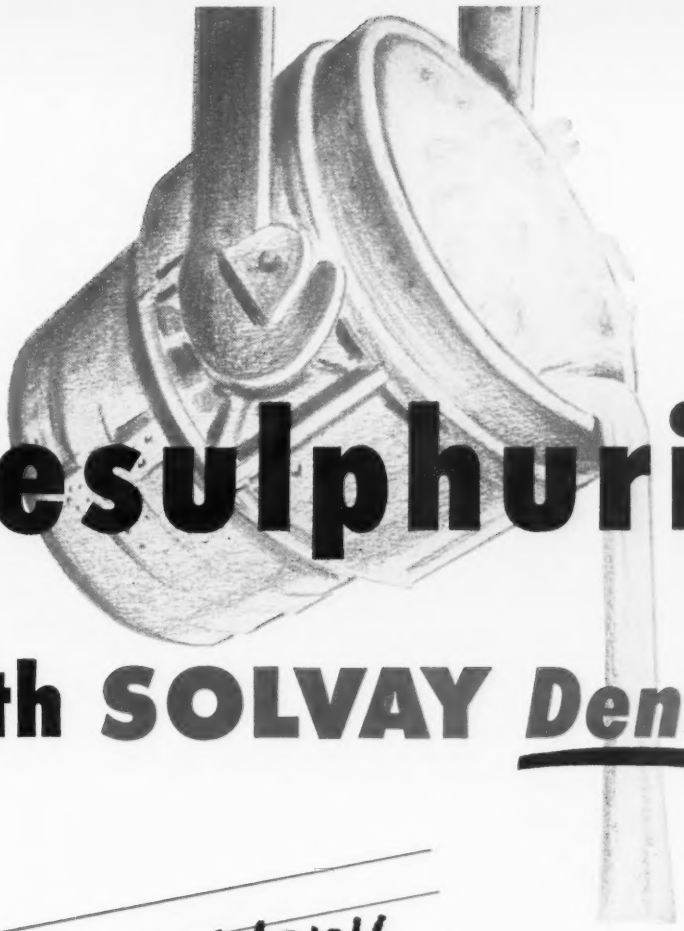
Henry R. Merrill, for the past 2 years assistant general sales manager, Behr-Manning Division, Norton Co., Troy, N. Y., was appointed gen-

JOSEPH A. STOTT
. . . refractories sales mgr.

HARRY W. CYPHERS JR.
. . . Borden Co. sales mgr.

HOWARD F. KULAS JR.
. . . abrasive sales, Cleveland

HENRY R. MERRILL
. . . general sales mgr.



Desulphurization

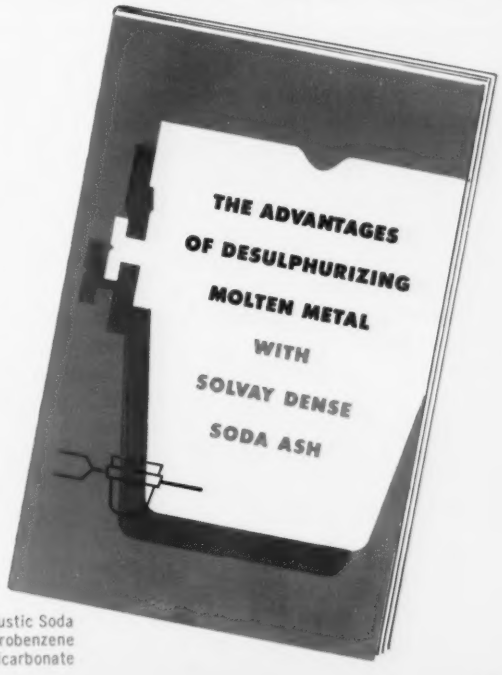
with SOLVAY *Dense* Soda Ash

SOLVAY DENSE SODA ASH has gained wide acceptance for efficient desulphurization. This 100% active material helps produce better, more fluid metal . . . and gives you these other advantages: it's free-flowing; the small grains melt very rapidly, allowing faster, more uniform dispersion; and it's easily added by means of simple equipment. The use of Solvay Dense Soda Ash is a flexible one—you use only as much as you need. And remember, Solvay Dense Soda Ash is the LOW COST form of desulphurization!

Further Information Contained in Valuable Book—Available on Request*

"The Advantages of Desulphurizing Molten Metal with Solvay Dense Soda Ash" has been published by Solvay for the benefit of the foundryman. It contains important information on the advantages you can gain by desulphurizing with Solvay Dense Soda Ash. It also explains what type of equipment is needed and how to obtain it. This book is available without cost or obligation*. Write for your copy today!

*In Western Hemisphere Countries.



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Chloroform • Methylene Chloride • Methyl Chloride • Carbon Tetrachloride • Sodium Bicarbonate

MEN OF INDUSTRY

NORMAN R. KIDD
. . . joins Bartlett & Snow Co.

RICHARD S. MOORE
. . . Harbison-Walker sales mgr.

eral sales manager, succeeding the late John M. Cook. Mr. Merrill joined the company in 1930, became Cleveland division manager in 1937, and industrial trades manager in 1942. He was named a company director last year.

Norman R. Kidd was appointed manager of the service and parts sales division recently opened by C. O. Bartlett & Snow Co., Cleveland. Mr. Kidd attended Case Institute of Technology and Fenn College, and for 10 years has been associated with the materials handling industry.

Joseph C. Huehn, comptroller, National Bearing Division, American Brake Shoe Co., St. Louis, and **C. C. Lay,** treasurer, the Wheland Co., Chattanooga, Tenn., were elected vice presidents of the Controllers Institute of America, effective Sept. 1.

Richard Wagner was named district sales manager in Delaware and part of Pennsylvania for De Walt Inc., Lancaster, Pa., a subsidiary of American Machine & Foundry Co., New York. He joined the company last year as a field representative.

Conde Hamlin, formerly executive vice president, was elected president, DeWalt Inc., Lancaster, Pa. Mr. Hamlin was associated with American Machine & Foundry Co., New York, the parent organization, prior to joining DeWalt.

Warren W. Marotz was appointed purchasing agent, Griffin Wheel Co., Chicago, succeeding the late Lloyd J. Scott.

H. D. McLeese was appointed general sales manager, Metal & Thermit Corp., New York. A graduate of University of Michigan, Mr. McLeese was previously vice president-general sales manager, United Chromium Inc., a company subsidiary.

Richard S. Moore, since 1953 assistant general sales manager, Harbison-Walker Refractories Co., Pittsburgh, was appointed general sales manager. He was graduated from University of Illinois and joined the company in 1929.

Kenneth M. Rice recently joined Reed Roller Bit Co., Houston, Tex., as advertising manager. A graduate of University of Texas, Mr. Rice was formerly assistant vice president-sales, Krafco Corp., Dallas, Tex.

Edward W. Sparkes was appointed manager of the Syracuse, N. Y., branch office, Crucible Steel Co. of America, Pittsburgh. He joined the company in 1935 and has served in the Syracuse office since 1947.

Ronald M. McDowell, comptroller and assistant secretary, Dalton Foundries Inc., Warsaw, Ind., was recently elected to membership in the Controllers Institute of America, New York.

W. H. Osborne was elected executive vice president, Acme Aluminum Foundry Co., Chicago, continuing as secretary-treasurer. **C. L. Sidinger** was named vice president-manufacturing and engineering.

Dr. Kent R. Van Horn, director of research, Aluminum Co. of America, Pittsburgh, recently received an honorary degree of doctor of science from Case Institute of Technology, from which he was graduated in 1926.

Paul M. Barnes recently was named export sales supervisor, Acheson Colloids Co., Port Huron, Mich.

Guide Describes Aluminum and Magnesium Castings

Design and specification of aluminum and magnesium sand, permanent mold and die castings are discussed in a practical handbook published by Rolle Mfg. Co., Lansdale, Pa. Sections of the book cover advantages and disadvantages of each of the common casting methods, suggestions for design of parts to be cast, and a survey of recent work accomplished and in process on light metals research and development.

Tables and charts, specification comparisons, mechanical and physical properties, recommended heat treatment procedures, chemical composition, etc., are included. A limited number of copies of the handbook are available upon receipt of requests on company letterhead addressed to Rolle Mfg. Co., Third & Cannon Ave., Lansdale, Pa.

Offers Booklets on Safety

Four booklets on how to use injury statistics to prevent occupational accidents have been prepared by the President's Conference on Occupational Safety and published by the Bureau of Labor Standards, U. S. Department of Labor.

Booklet No. 1 covers "Accident Causes and Cause Coding," No. 2 covers "Estimating Costs of Industrial Accidents," No. 3 "Investigation of Accidents for Cause and Remedy," and No. 4 "Work Injury Rates." Each costs 10 cents, except No. 3, which sells for five cents. All may be ordered from the Superintendent of Documents, U. S. Government Printing Office, Washington 25.

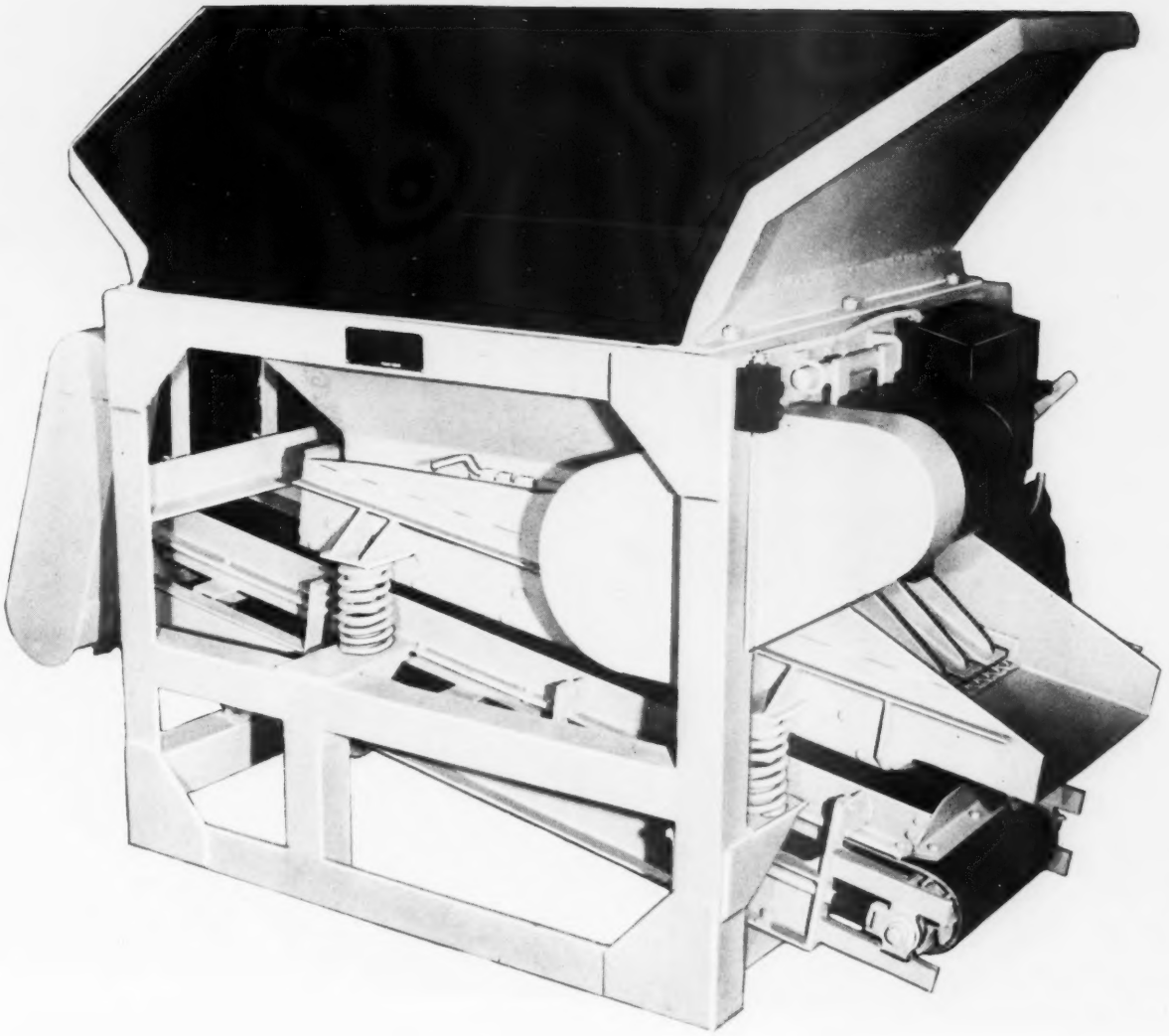
Book Review

Titanium in Iron and Steel, by George F. Comstock, cloth, 6 x 9 in., 294 pages, published by John Wiley & Sons Inc., 440 Fourth Ave., New York 16. Price $6.

Opening with a general discussion of titanium and its minerals, principal sources, concentration and preparation, the book examines the properties and effects of the element as an addition to cast iron and steel. Its deoxidizing effects are covered and there is emphasis placed on its effects in stabilizing nitrogen and fixing carbon in alloys where other carbides may be undesirable.

The volume also critically reviews and correlates all the important data in world literature on titanium as an alloying element in iron and steel. Nearly 300 papers that were reviewed are listed in a bibliography.

FLOOR MOUNTED... *no pits required for the* NEW "60" PREPARATOR



NEW MACHINE DESIGNED FOR USE WITH ANY FRONT-END LOADER

The new "60" Preparator—designed for use in B&P Speedmullor-Preparator Units—completely conditions up to 40 tons of molding sand per hour, and can be installed without pits of any kind. This one "most needed" feature would make the new "60" Preparator big news, but look at the other new features:

1. 50% greater loading hopper capacity—no waiting to load.
2. Flush-sided construction permits easy loading.
3. Loading height only 4'-2"—low enough for any loader—no ramps required.
4. Permanent magnet separation—no tubes, no rectifiers.
5. High-capacity high-frequency screening—new performance records.
6. New lump breaker—more effective handling of lumps.
7. Also available in a portable model.

For rugged construction and dependable performance, it's the new "60" Preparator. Write now for full data . . . *Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 N. Cicero Avenue, Chicago 39, Illinois.*

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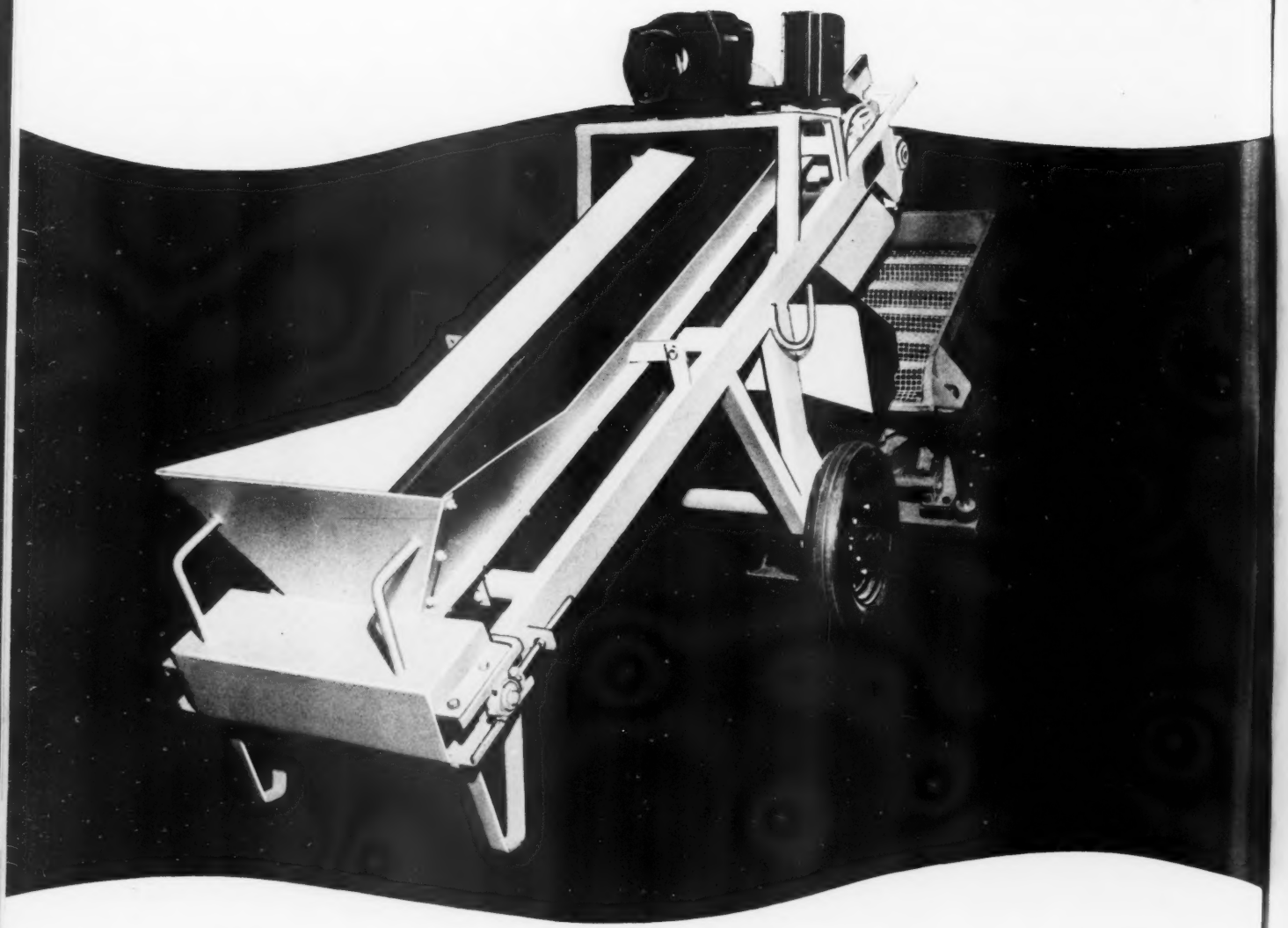
MEMBER FEMA

HERE'S THE NEW PORTABLE

MAGNAVEYOR

to improve your casting surface



The Magnaveyor is a sturdy new belt loading unit with a dependable permanent magnet separator, built by Beardsley & Piper to meet a definite need for better foundry sand preparation.

The Magnaveyor loads a B&P Screenarator, or other conditioner, at a rate of up to 1500 pounds per minute, and completely separates iron scrap, shot, and wires and nails from the sand being loaded. It is highly portable and may be easily moved by one man from foundry floor to floor. It is easily and quickly placed in operation with a Screenarator, or other device, and appreciably increases the efficiency of the conditioning unit with which it works.

A small knee-high hopper for shovel-loading makes the Magnaveyor particularly convenient for side floor sand preparation. Once you try it your molders will never want to do without it. Write now for information. *Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 N. Cicero Avenue, Chicago 39, Illinois.*

LOOK TO
BEARDSLEY & PIPER
FOR BETTER METHODS

MEMBER FEMA

Original board of directors of the society was honored at the annual meeting

First Directors Honored at

NONFERROUS FOUNDERS' MEETING

By FRANK G. STEINEBACH
Editor

ANNUAL meeting of the Non-Ferrous Founders' Society, held at the Congress Hotel, Chicago, May 21, was concerned with reports of society activities, a look at the Washington picture, and honoring the original board of directors of the organization.

The annual dinner meeting of the society, sponsored by the Chicago Chapter, paid formal tribute to the founding board of directors. Cast bronze plaques were presented to the following in attendance at the dinner: A. M. Cadman, Pittsburgh; Fred J. Eberhardt, Chester K. Faunt, Walter W. Hunter and Albert Meskan, Chicago; Louis Fisher, Dunellen, N. J.; George B. Hazen, Peoria, Ill.; Edwin W. Horlebein, Baltimore; Roy M. Jacobs, Milwaukee; and L. M. Nesselbush, Lowellville, O. Plaques were sent to the following who were unable to attend: Thomas Addie and Harry Burgin, Philadelphia; Justin A. Duncan, Boston; James F. Gilbert, St. Louis; and Fred A. Mainzer, San Francisco.

Election of directors resulted in the following new members being added to the board for three-year terms: A. J. Messmer, Messmer Brass Co., St. Louis; J. H. Brennan, Pittsburgh Brass Mfg. Co., Pittsburgh; W. L. Leopold, Northern Bronze Co., Philadelphia; R. W. Sweitzer, I. S. Spencer's Sons Inc., Guilford, Conn; G. T. Fisher, Fisher Casting Co., Dunellen, N. J.; and P. E. Lankford, East Birmingham Bronze Foundry Co., Birmingham. W. W. Dyer, Trinity

WILLIAM L. LEOPOLD
President

EDWARD J. METZGER
First Vice President

CHARLES J. EGETTER
Second Vice President

JAMES W. WOLFE
Secretary-Treasurer

Speakers table at the banquet, annual meeting of the Non-Ferrous Founders' Society

Brass & Copper Co., Dallas, was elected for a two-year term.

At a meeting of the new board, the following officers were elected: President, W. L. Leopold, Northern Bronze Corp., Philadelphia; first vice president, E. J. Metzger, Multi-Cast Corp., Wauseon, O.; second vice president, C. J. Egetter, Crown Brass Mfg. Co., Los Angeles; secretary, James W. Wolfe, Chicago; assistant secretary, Edith Alexander, Chicago.

At the opening meeting, Robert Langsenkamp, Langsenkamp-Wheeler Brass Works Inc., Indianapolis, outlined the insurance program of the society and the progress that has been made. Russell M. Tolley of the NFFS insurance department urged that members recognize the social trends of labor demands and take advantage of the savings possible to individuals or groups of foundrymen. He stated that any member of the society wishing to consult with the department on any type of insurance, and especially social insurances, may have such consultation free. Many foundries, he said, could save considerable through a better look at the insurance program.

James W. Wolfe, secretary, reviewed the progress of the society during the past 12 years. He indicated that financially the organization had reached the goal in the matter of reserves and that for the immediate future practically all revenues would be used in furthering the work of the organization.

W. L. Leopold, chairman of the Membership Committee, reported that the society has 360 members. He said that the board of directors are planning additional help in the national office so that the secretary may travel more extensively in serving the membership. He emphasized that the organization has a tremendous selling package which includes industry surveys, cost programs, insurance program and eminently successful Washington contacts.

E. J. Metzger, reporting for the Cost Committee, stated that the revised cost manual had been distributed to membership during 1954. He stressed the importance of uniform costs and stated that the committee is making progress in obtaining qualified cost accountants to sponsor cost clinics and cost analysis assistance to foundries interested in bringing their cost accounting methods up to date. Mr. Metzger also reported that several cost articles had been published in *The Crucible*, the society's publication.

Discussed Washington Contacts

Contacts in Washington were discussed by Mr. Wolfe. The secretary believes that standby controls will be authorized, but how far they will be used remains a question. He reported on the various moves made on the exporting of scrap metals and stated that the recent investigation by the Small Business Committee of the House was instigated by society presentations. It was suggested by the membership in attendance that the secretary continue his efforts to get other Washington bureaus interested in protecting the supplies so vital to the industrial life of the nation.

Mr. Wolfe also discussed the matter of government competition with business and said that his efforts to find a list of government foundries making nonferrous castings had not been too successful. Efforts will be continued to obtain this information.

H. A. White, Smeeth-Harwood Co., Chicago, and president of the society, reported that the committee appointed to study the product development foundry project had not completed its work and that the board of directors had extended the life of the committee for another six months so that a concrete plan may be presented. In this connection, David C. Minton Jr., Battelle Memorial Institute, Columbus, O., discussed "The Importance of Group Research and Group Product Development." Mr. Minton said that the volume of group research has doubled in the last ten years. The work has been most useful in connection with government emergency programs and has been of great benefit to industry. He outlined the work in die cast metals and alloys of zinc base undertaken through ASTM sponsorship, the research program of the Gray Iron Research Institute, studies on problems of blast cleaning sponsored by the Steel Founders' Society of America, and other similar projects. He stated that research no longer is a luxury in modern business but a necessity for economic growth.

Report of the Chapter Activities Committee, presented by Walter M. Clark, D. W. Clark & Co., South Boston, Mass., indicated that the society has 13 chapters and that more will be established in the near future. Efforts will be made in districts removed from large foundry centers to bring the members together for meetings on management problems.

The secretary reported that the Potentials Survey and Buyers' Guide is being revised and that the new edition should be in the hands of the various government agencies before the end of June. He emphasized the importance of getting this information to government agencies.

At the luncheon, Edward C. Hoenicke, president, Foundry Educational Foundation, pointed to the tremendous part that the foundry industry plays in our national economy and emphasized that the strength of the industry lies in the men who will make up the foundry organizations for the future. He told of the tremendous progress of the FEF during the past eight years, both in spreading the gospel of castings and in interesting engineers in the foundry industry. In conclusion he urged the proper financial support from both firms and individuals for future operation of the foundation.

William A. Meissner Jr., deputy director, Copper Division, Business and Defense Services Administration, described the action of the Copper Division in pushing for curtailment in the exportation of copper-base alloy scrap. In addition to the action on export controls, the BDSA initiated

Photo courtesy Hyster Company

Moves 50 TONS of sand in less than 5 HOURS with ALLEN SHOVEL on Hyster Fork Truck

WESTERN INDUSTRIAL SUPPLY COMPANY, PORTLAND, OREGON, furnishes sand, coke and other materials to foundries in the Portland area. To handle these materials efficiently and fast, Western Industrial uses an Allen Shovel on a Hyster fork truck.

Sand, for example, comes in 50-ton gondola cars, is dumped on the rail siding and delivered by dump trucks. The Allen-equipped fork truck loads a 5-ton truck in less than 15 minutes, including round trips between car and truck. In less than 5 hours the entire 50 tons can be loaded out.

Performance like this is typical of an Allen Shovel-fork truck combination. Its superior maneuverability is due to shorter overall length, shorter turning radius, greater dumping height. Quick change-over from shovel-to-forks-to-shovel makes the fork truck a two-in-one machine that can be kept profitably busy *all* the time. In shovel operations, clutch-life has proved to be much longer and truck maintenance exceptionally low.

Improve *your* competitive position by cutting handling time and costs in your foundry with an Allen Shovel on a fork truck. Send for details today. Use handy coupon.

ALLEN SHOVELS are available for all makes of fork trucks.

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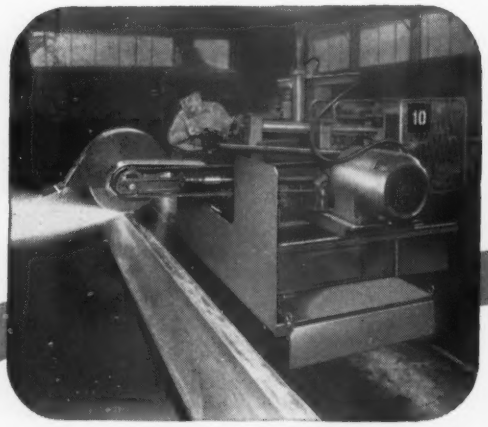
Specify make and model of truck .....

No matter what grinding method you use...



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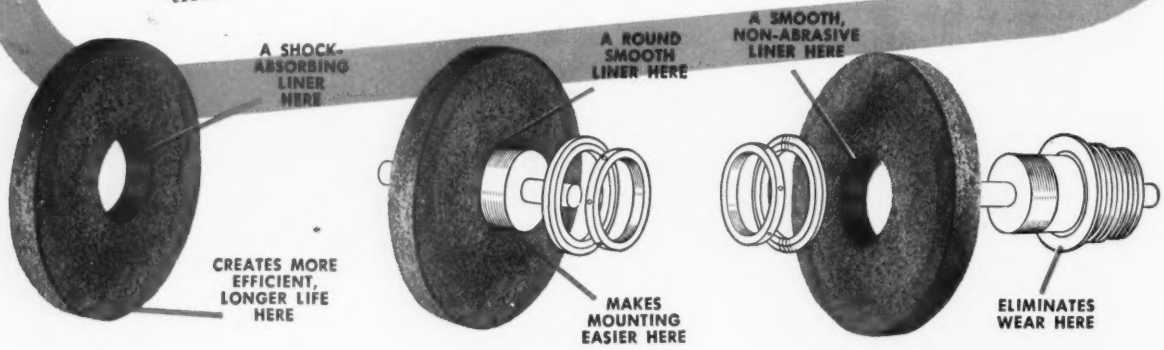
2. Mid-West snagging wheels' extra-tough bonds are designed especially for billet snagging, grinding of steel and alloy castings, and snagging operations on all types of non-ferrous metals and cast irons.

Here is real grinding efficiency that's bound to help you cut high production costs. For complete information—write, wire or phone today.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a request to the Office of Defense Mobilization that government-owned copper purchases under DPA contracts be made available to industry, together with a complete diversion of refined copper destined for delivery to the stockpile. Authority for this move was granted in October, and the division distributed the copper in hardship cases. Other activities of the division include the "Copper Industry Quarterly Report" which gives activities of the division and pertinent data and statistics on copper; the work on mobilization base planning; studies on needs of government in the field of castings, brass mill products, and wire mill products for mobilization; and the work of standardization and marking of copper and copper-base alloys and products.

Mr. Meissner stated that in his opinion business in the brass and bronze foundry industry is on the increase. This was reflected in an 18 per cent increase in shipments of brass and bronze castings in March compared with February; a slight increase in military requirements for the third quarter of 1955, and a general increase in consumer sales which points to a continued demand for foundry products. The high rate of housing starts also should add to the demand for such castings. In conclusion, Mr. Meissner stated that the information developed by BDSA is available and that members of the industry are welcome to present their metal problems to the administration at any time.

Three Booklets Discuss Disaster Prevention

Steps for prevention and control of emergency disaster situations in plants are presented in three booklets available from the Association of Casualty and Surety Companies.

"Before Disaster Strikes," presents a plan of organization for disaster control. "Fire Control" is a revised manual presenting accepted procedures for handling fire protection equipment and methods of preventing industrial fires. "Panic and Its Control" was written by Dr. Walter Cutter of the Center for Safety Education at New York University. It covers the nature and causes of panic as well as prevention and control.

Pamphlets are available at 10 cents a copy, with reductions for orders of 100 copies or more. Address orders to the Association of Casualty and Surety Companies, Accident Prevention Dept., 60 John St., New York 38.

Investment Casting Institute Announces New Members

Companies recently elected to membership in the Investment Casting Institute, Chicago, and their representatives include the following: Brace Inc., Minneapolis, C. H. Brace; Illinois Precise Casting Co., Chicago, Robert J. Harvey; Industrial Fine Castings Ltd., Toronto, T. W. Morewood; and A. P. Green Fire Brick Co., Mexico Mo., which was elected an affiliate member, Karl K. Breit.

Other members elected within recent months are: Bone Engineering Co., Glendale, Calif.; Precision Castparts Corp., Portland, Oreg.; and Z & H Mfg. Co., Peekskill, N. Y. Industrial Raw Materials Corp., New York, and Michigan Steel Casting Co., Detroit, were elected affiliate members.

CALIFORNIA GRAY IRON FOUNDRYMEN MEET

Officers of the GIFS California Groups. Left to right: Gordon L. Martin, Atlas Foundry & Mfg. Co., Richmond, chairman of Northern California Group; D. L. Robertson, Apex Steel Corp., Los Angeles, secretary, Southern California Group; Charles Gregg, Gregg Iron Foundry, El Monte, president, Southern Group, and Earl Paltenghi, organizer and a former chairman of the Northern California Group

EIGHTY-SIX California gray iron foundry executives and their ladies met Apr. 29-May 1 at the Santa Barbara Biltmore, Santa Barbara, Calif., for a regional meeting of the Gray Iron Founders' Society.

The society's president, C. H. Ker, president, Dalton Foundries, Warsaw, Ind., and the executive vice president, Don Workman, were guests of the California foundrymen at this three-day meeting.

General chairman was Charles Gregg, Gregg Iron Foundry, El Monte, representing the southern group which acted as host for this second regional meeting.

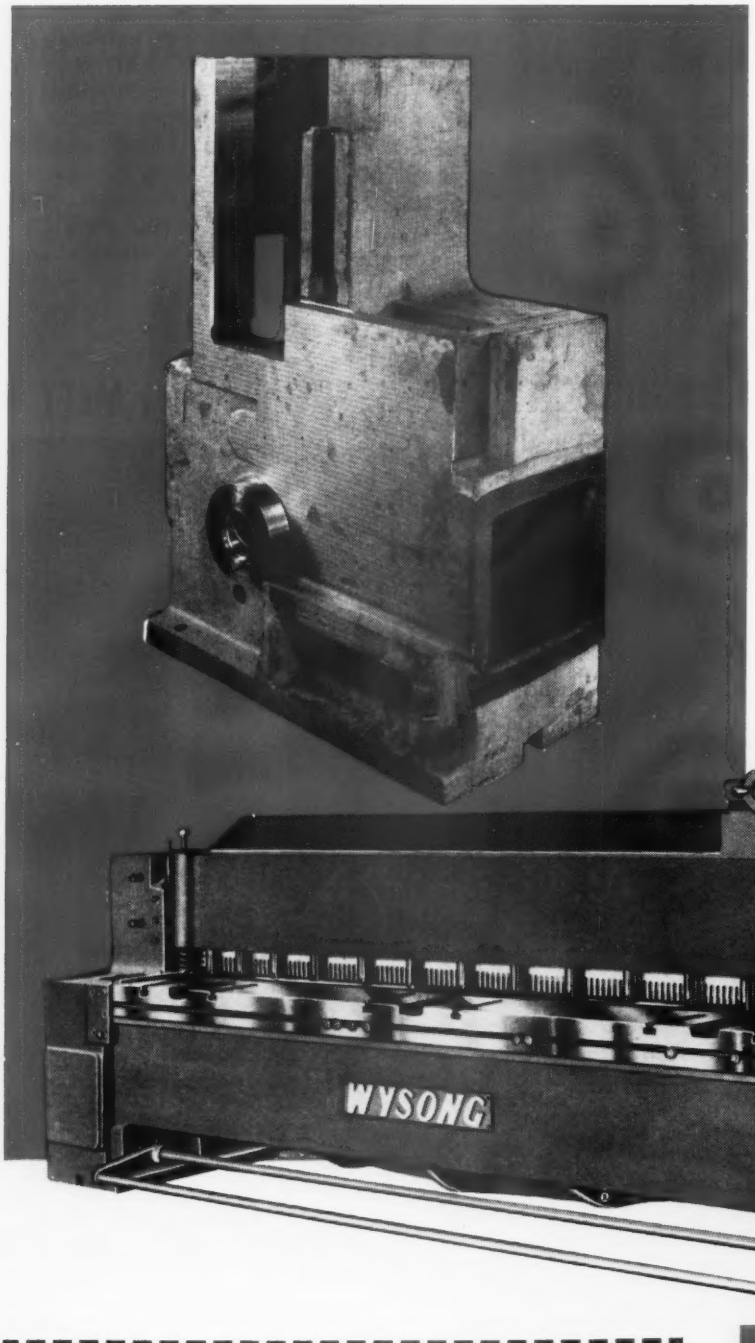
Al Renfrow, Renfrow Foundry, discussed the basic principles and future plans for regional meetings. The group, representing 33 foundries, then proceeded to compare and discuss charted cost of raw materials, labor rates, operating rates, business conditions, and the outlook ahead.

Earl Paltenghi, of the H. C. Macaulay Foundry, Berkeley, and trustee-at-large for the Foundry Educational Foundation, presented the latest developments, facts and figures on the foundation.

An interesting discussion on West Coast air pollution problems was led by Al Sanchez, of Vulcan Foundry, Oakland, Gerald Nash of Quality Foundry, Los Angeles, and Charles Bradley of Dayton Foundry, Hollydale. Climaxing the session was an informal address by Leo Harris, former assistant prosecutor of Los Angeles county, who is now in private law and consulting practice.

Jack Barrett, of Federal Burner Corp., reviewed current employment practices and problems, and touched on the possibility of some form of credit information service which might be helpful to smaller companies in the area.

Don Workman, speaking for GIFS, discussed current industry statistics and business trends. He also urged the group to make fuller use of society services and publications which have steadily been gaining increased recognition in recent years.



CHATEAUGAY TOUGH

Photo, courtesy of Wysong & Miles Company, Greensboro, N. C., manufacturer of power squaring shears, woodworking machinery, bending rolls.

REPUBLIC STEEL CORPORATION
3132 East 45th Street
Cleveland 27, Ohio

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PIG IRON MAKES CASTING JOBS EASY...

The gear box and end frame housing, shown at left, for a power squaring shear are good examples. Because both hold oil to lubricate moving parts, freedom from porosity is a prime casting requirement—plus density, strength and wear-resistance.

To meet these strict requirements, the manufacturer uses Chateaugay, Republic's exclusive premium Pig Iron. The results are dense, strong castings with high wear-resistance and no porosity. Chateaugay fills molds completely and quickly—sets rapidly and shrinks evenly. Regardless of size or shape, Chateaugay produces uniform soundness, close grain structure and uniform cross-section density throughout every casting.

Chateaugay castings are inherently tough, strong and resistant to wear. Yet they machine easily and economically whether planed, milled, drilled, tapped, reamed or ground.

A Republic Pig Iron Metallurgist will be happy to give you the complete story on Chateaugay, the low phosphorus, copper-free Pig Iron, and the way it can help you make tough casting jobs easy. There's no cost or obligation for his services. Just let us know when you would like him to call.

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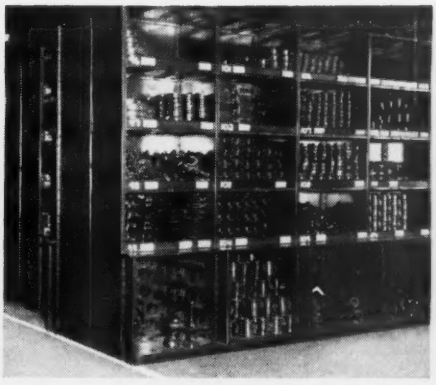
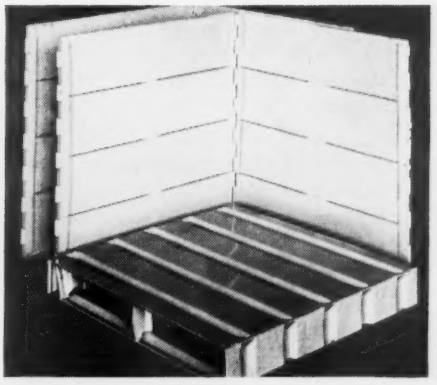
EASY WAY TO HANDLE HEAVY CASTINGS—Republic Chain Slings provide an exceptionally high degree of safety in numerous foundry operations, like moving and handling heavy castings, flasks, etc. Made by Republic's Round Chain Division, they're available in alloy steel, High Test Supersteel, and wrought iron. All are proof tested and warranted to meet or exceed specifications.



EASY WAY TO STACK ENORMOUS WEIGHTS—Republic Wedge-Lock Steel Shelving is designed for high stacking of heavy items—with no sagging, swaying or buckling. Joints actually get tighter as weight increases. Made by Republic's Berger Division, Wedge-Lock Steel Shelving provides maximum loading in minimum floor space. Completely flexible, it assembles quickly and easily.



EASY WAY TO REDUCE INTERPLANT SHIPPING COSTS—The Collaps-a-tainer was developed by Republic's Pressed Steel Division to reduce interplant shipping costs. Four collapsed units ship in the space of one open unit. It's easy to assemble, lightweight, strong and durable, easy to knock down. It stacks to any practical height and can be used on the production line or as a storage bin.

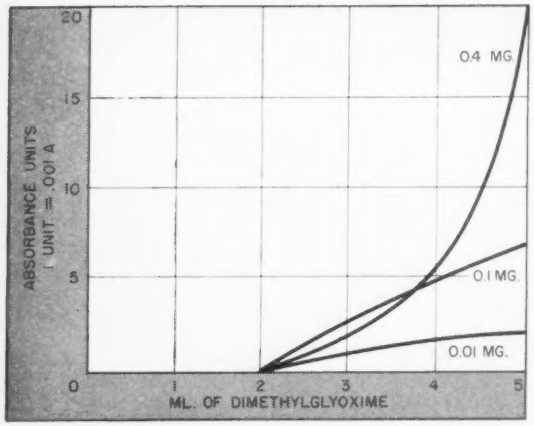


Fig. 1—Effect of dimethylglyoxime concentration with Ni concentration fixed. Temperature of room was 81°F

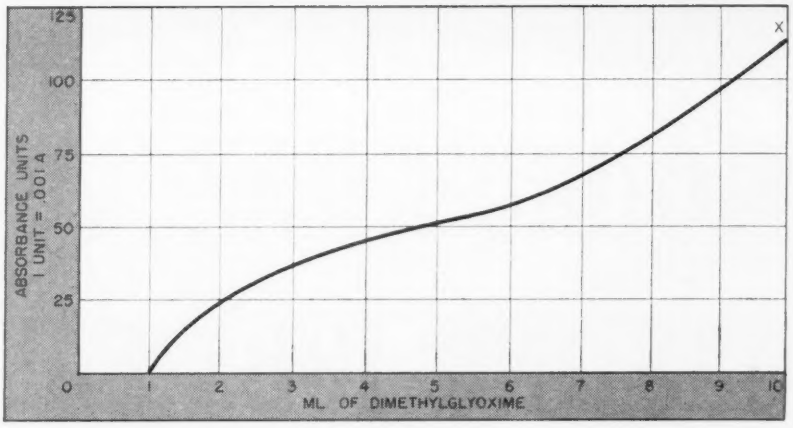


Fig. 2—Chart shows effect of dimethylglyoxime concentration beyond the limits of procedural errors, through 10 ml of dimethylglyoxime. Nickel concentration was 0.4 mg and temperature of the room was 88°F

Photometric Nickel Determination

The author describes a study which revealed that the photometric dimethylglyoxime method of nickel determination needs close control of variables to insure production control accuracy in copper-base alloys

By FRANK J. VERSAGI
Mueller Brass Co.
Port Huron, Mich.

DURING the routine application of the photometric dimethylglyoxime method for nickel determination in the production control of copper-base alloys, gross errors were encountered. Because on several occasions these errors did not occur when the same samples were run later by a senior chemist, it first was assumed that the routine operators' techniques were at fault. A more careful survey of the errors revealed, however, that different operators, with various apparent skills, were encountering errors of the same magnitude. This discovery led to a more thorough study of the method insofar as it applies to copper-base alloys. The method used is that recommended by the American Society for Testing Materials.[1]

This study revealed that the photometric dimethylglyoxime method for nickel is more highly empirical than formerly thought and needs close control of variables to insure even production control accuracy. The need for closely defined procedures is pointed out by Snell and Snell[6] and Sandell[5]. Although the ASTM[1] indicates that a single calibration curve can be used for several alloys, it was found that accuracy is reduced significantly by use of different alloys to plot a single calibration curve.

The effects of reagent concentration, temperature, foreign ions, time and nickel concentration were studied.

Apparatus and Solutions—Solutions used in the method are as directed by the ASTM[1]. A Beckman Model B spectrophotometer was used during the study, and, where possible, parallel studies were made with the Fisher electrophotometer.

Concentration of Reagents—The study of the effect of reagent concentration was made on a solution of pure nickel in nitric acid and on four types of alloys—Bureau of Standards samples. See Table I.

The alloys were dissolved by various methods and electrolyzed under different conditions, the purpose being to determine any effect of the various acid mixes and electrolytes on the color development. The study included nitric acid, nitric-sulfuric and hydrofluoric-boric, with and without the use of sulfamic acid as an addition agent.

Dimethylglyoxime—In the routine measurement of the three ml of dimethylglyoxime (1 per cent ethanol) used for photometric development of the red lake, a graduate normally is used. Investigation showed that when running a set of production samples, the technicians measured from 2 to 5 ml of the reagent. Accordingly, 2, 3, 4 or 5 ml portions of dimethylglyoxime solution were added to various nickel concentrations of the standard nickel solution. The results (Fig. 1) indicate clearly that the amount of dimethylglyoxime has an appreciable effect on the resulting color intensity, the more so as the nickel concentration increases. This increase in color intensity continued beyond the limits of procedural error through 10 ml of dimethylglyoxime (Fig. 2). No study was made beyond this point.

The same effect was observed to a lesser degree with aliquots from electrolytes of the alloys. Typical results are given in Table II. The manganese bronzes tended to give erratic results as the dimethylglyoxime concentration was varied. In one case, absorbance decreased as the reagent concentration increased.

TABLE I—ALLOYS USED IN INVESTIGATION

Bureau of Standards No.	Name	Pertinent Constituents
37d	Sheet brass	27% Zn, 0.97% Sn, 0.08% Fe, 0.58% Ni
124b	Ounce metal	5% Zn, 0.26% Fe, 0.76% Ni
62	Manganese bronze	35% Zn, 1.6% Mn, 1.1% Fe, 0.64% Ni
164	Manganese-aluminum bronze	22% Zn, 2.5% Fe, 4.7% Mn, 6.2% Al, .046% Ni

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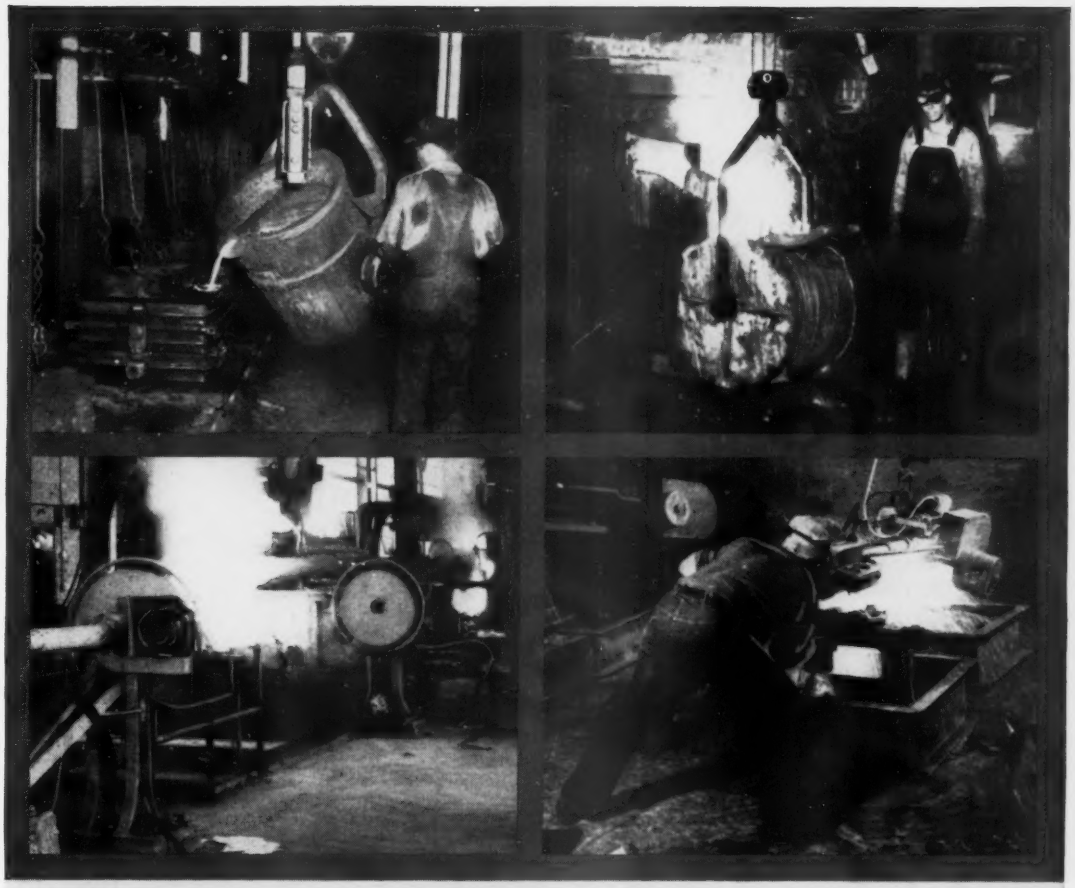

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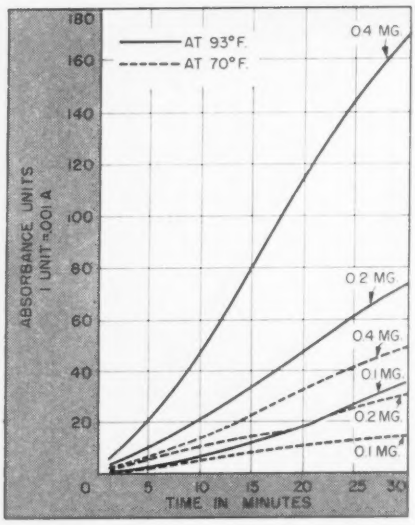


Fig. 3—Time-temperature-absorbance study used standard nickel solution

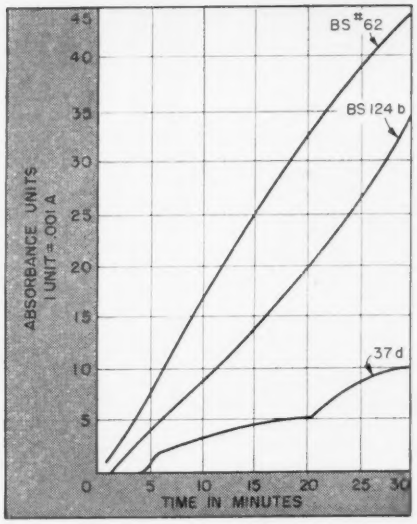


Fig. 4—In time-absorbance study, nickel concentration was 0.13 mg, and temperature of room was 80° F

in complete reversal of the results obtained with the pure nickel, sheet brass, and ounce metal. However, it was possible to reproduce readings at any one reagent concentration with the manganese bronzes.

TABLE II—TYPICAL EFFECT OF EXCESS DIMETHYLGLYOXIME ON DIFFERENT ALLOYS

(Nickel concentration in all cases—0.2 mg)

Alloy	Error	Δ A
124b	2 ml x s	+.004
37d	2 ml x s	+.002
62	2 ml x s	—.010
Pure nickel	2 ml x s	+.012

Since it was possible that the dimethylglyoxime itself might be at fault, the experiments were repeated with a newly purchased lot from another supplier. The new reagent was used both as a 1 per cent ethanol solution and as a saturated water solution. Equivalent amounts of the water soluble sodium dimethylglyoximate also were used. Results were the same in all cases.

Mitchell and Mellon[4] indicated that there is no change in absorbance as the dimethylglyoxime concentration is increased. However, their maximum reagent concentration was 20 ml of a 0.1 per cent solution, equivalent to only 2 ml of the 1 per cent solution recommended by ASTM.[1]

Temperature of the solution during the recommended 10-minute color development affected the magnitude but not the relative values of these results. The effect of temperature will be discussed below.

Citric Acid—The quantities of citric acid (100 g/l) were varied by a factor of 3 with no effect on the absorbance. This excludes, of course, the precipitation of hydroxides if too little citric acid was used and the solution made ammoniacal.

Ammonium Hydroxide — The amount of ammonium hydroxide (1:1) was found to be without effect on the color development to 20 ml. For production control, 10 ml of the reagent is added to each sample instead of 3 ml in excess of the amount needed to bleach the bromine as recommended by ASTM.[1]

Bromine Water—It was found that with nickel concentrations above 0.5 mg/100 ml, strength of the bromine water was critical. If the bromine water was not fully saturated and/or not allowed to react a sufficient length of time before being bleached, all the nickel was not oxidized to the tetravalent state, and a precipitate rather than a colored lake formed. In many cases the precipitate was so evident as to be no source of error. However, in other cases when the absorbance was known to be too high, a very fine, colloidal precipitate was found when the solution was centrifuged and filtered. In these cases, since the precipitate was practically invisible, routine operators often reported the erroneous high reading as a true measurement.

The procedure was so standardized that the "saturated" bromine water is not considered strong enough unless bromine fumes pour from the bottle when the reagent is measured. Further, a minimum of 30 seconds is required before the excess bromine is bleached with the ammonium hydroxide.

Temperature—The literature is full of references to temperature as a source of error in photometric work. ASTM[2] mentions the need in some methods for summer and winter calibration curves, although no specific methods are named.

It was found that, besides the generally different room temperatures encountered seasonally, the laboratory temperature varies as much as 20° F during the day, depending on the chill of the night before, the normal rise during the day and the heat generated by extra hot plates, furnaces, and burners turned on each morning.

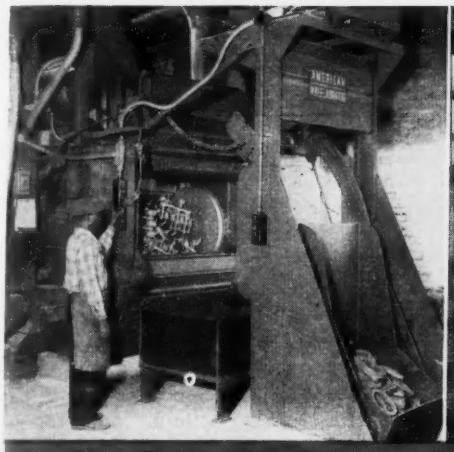
To investigate the effect of temperature, three concentrations of pure nickel were treated with exactly 3 ml of dimethylglyoxime and the absorbance plotted against time every minute for 30 minutes. One set was run in the routine laboratory at 93° F; another was run at 70° F in an air-conditioned spectrographic room. The results (Fig. 3) indicate clearly the great errors possible by neglecting temperature corrections after a calibration curve has been established. The results indicate further that it is more accurate, photometrically speaking, to obtain smaller concentrations of nickel by suitable adjustment of sample weight or aliquot.

It was found that the error due to temperature increased approximately sixfold when the temperature rose from the 80's to the 90's as compared to the error from 70° to 80° F. Thus, a calibration curve set up at 83° is useless at 93° unless a temperature coefficient has been determined.

Time—An absorbance study was conducted on three of the four alloys with readings taken every minute for 30 minutes. The results (Fig. 4) clearly point out that the formation and stability of the nickel-dimethylglyoxime lake are not the same for different alloys and are completely different for pure nickel (Compare Figs. 3 and 4).

In routine work, running six samples in a set, it was found that the last measurements were taken from 12 to 14 minutes after addition of the dimethylglyoxime to the last sample in the set. The error caused by reading the first and last sample some two minutes apart was within the normal reproducibility of such results. There seemed to be no really level portion in the time-absorbance curves (Figs. 3 and 4) in the 30 minutes studied.

Nickel Concentration and Alloy Effect—Generally, as the nickel concentration increased, the effect of the various sources of errors increased. ASTM[1] states that the nickel-dimethylglyoxime color reaction follows Beer's law to 1 mg/100 ml of solution. Sandell[5] holds that 6 ppm (0.6 mg/100 ml) is the working limit. Actually, when the nickel concentra-



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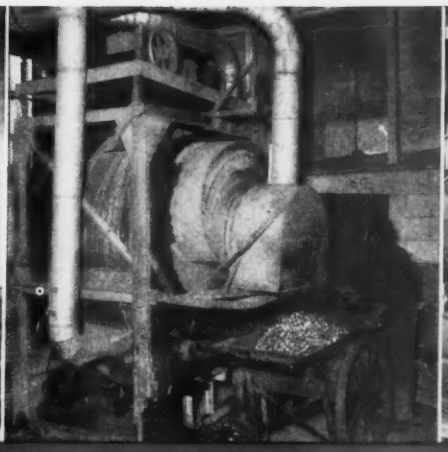

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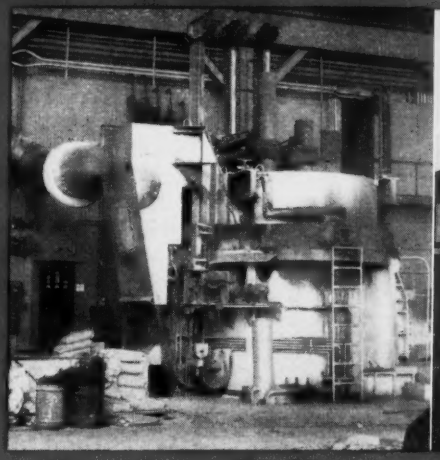

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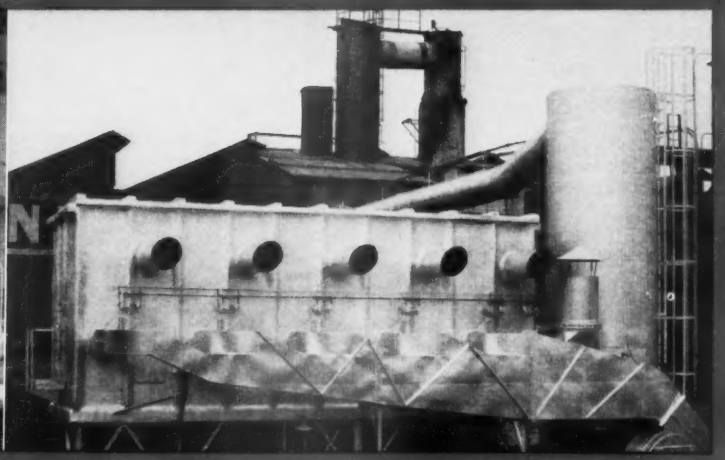

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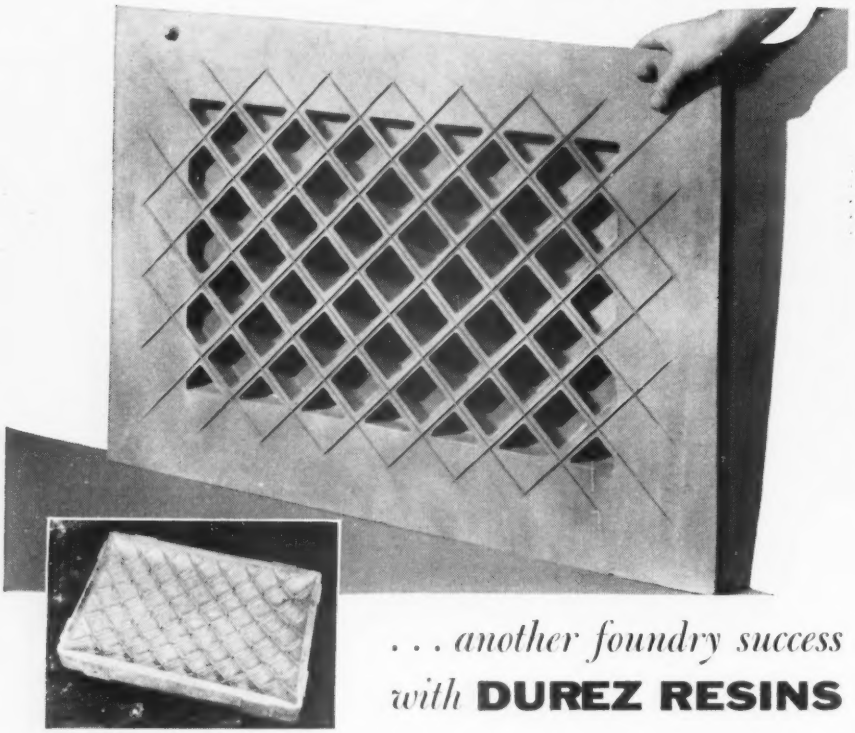

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tion rises above 0.5 mg/100 ml the absorbance is high enough to reduce considerably the precision of measurements. Also, depending on the other ions present, the strength of the bromine water, and the reaction temperature, the chance of precipitation increases greatly with higher concentrations of nickel.

The "alloy effect" of the various metals to be found in the various copper-base alloys is a factor to be considered. Depending on the method of separation used, the solution containing nickel also may contain zinc, tin, iron, aluminum and manganese in varying amounts. Manganese seems to cause the greatest interference, and ASTM[1] recommends that separate calibration curves be set up for manganese bronzes.

To ascertain the interchangeability of calibration curves for different alloys, replicate determinations were made on different days at 5 points on each curve. The absorbance index, *a*, (terminology according to Bureau of Standards[3]) was determined for each alloy with the results listed in Table III.

TABLE III—ABSORBANCE INDICES OF VARIOUS ALLOYS

Alloy	No. of Samples	Average Absorbance Index	Maximum Deviation
124b	14	1.10	.03
37d	12	1.07	.01
62	16	1.19	.03

The maximum deviation on any one alloy was 0.03 and the mean deviation was less than 0.02. In the case of alloy 37d, the maximum deviation of the absorbance index was 0.01.

These values illustrate the precision possible with each alloy and further illustrate that it would not be wise to use alloys of entirely different compositions to set up a single calibration curve without previous consideration of the precision required and the precision obtainable.

Conclusions — 1. The amount of dimethylglyoxime must be carefully controlled. For production control, the limit should be 3 ml plus or minus 0.5 ml. For precise work the dimethylglyoxime should be dispensed with a buret.

2. The temperature variations in a normal laboratory, even on a given day, must be compensated for, and the absorbance index should be checked by running a standard along with the samples if the temperature has changed more than 5°F. Over a period of time it may be possible to establish absorbance indices for various temperatures.

3. Despite the theoretical consideration that greatest photometric accuracy is obtained at 36.8 per cent T (approximately 0.43 A), the cumula-

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tive effect of all error producing variables in this method is too great at the nickel concentration required (0.4—0.5 mg/100 ml). Errors are minimized and greater accuracy obtained if the nickel concentration is so controlled as to cause the readings to fall between 50—70 per cent T (approximately 0.15—0.30 A).

4. Bromine water must be kept at full strength, especially when work is with higher concentrations of nickel. This precaution will prevent the formation of a colloidal precipitate not readily visible.

5. Citric acid and ammonium hydroxide additions are not critical within the limits of normal procedural error.

6. Accuracy is reduced when a single calibration curve is set up using different alloys. Since the nickel-dimethylglyoxime color reaction is known to follow Beer's law, it is necessary only to plot one curve using a single alloy—to ascertain the linearity of the instrument. Thereafter it will do to determine the absorbance index of any other alloy by running a known nickel concentration some distance from the origin.

For very precise work, the best method seems to be that of running a standard with the unknown samples and using the absorbance index found for that series alone. Such a procedure cancels out errors of wave length settings, variable slit widths, and other procedural errors which may have varied from the time of initial calibration.

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2. *Ibid*, p. 51.
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4. Mitchell, A. M., and Mellon, M. G., Ind. Eng. Chem., Anal. Ed. 17, p. 380-2 (1945).
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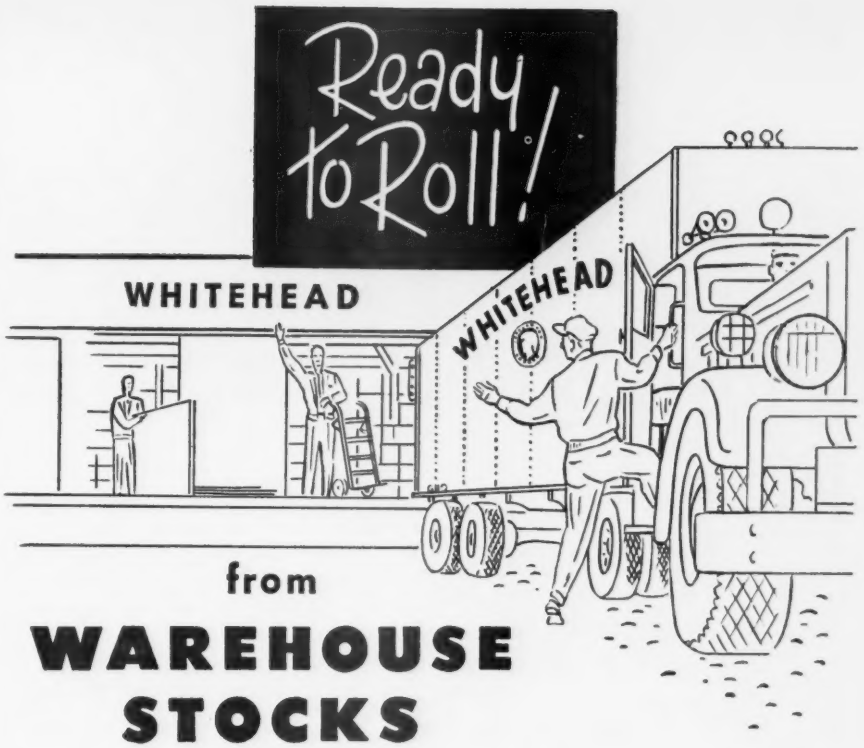
6. Snell and Snell, *Colorimetric Methods of Analysis*, 3rd ed., Vol. II, (D. VanNostrand Company; New York, 1953), p. 345.

Iowa Foundries Among Safety Award Winners

Foundries were among 21 companies presented safety awards recently at the annual meeting of the Industrial Safety Association of Iowa in Des Moines. Foundries cited for improving their safety records during the past year through reduction of on-the-job accidents include: Murray Iron Works, Burlington; Iowa Steel & Iron Works Inc., Cedar Rapids; Marshalltown Foundry Co., Marshalltown; the Maytag Co., Newton; Eagle Iron Works Inc., Des Moines; and John Deere plants in Ottumwa, Waterloo and Dubuque.



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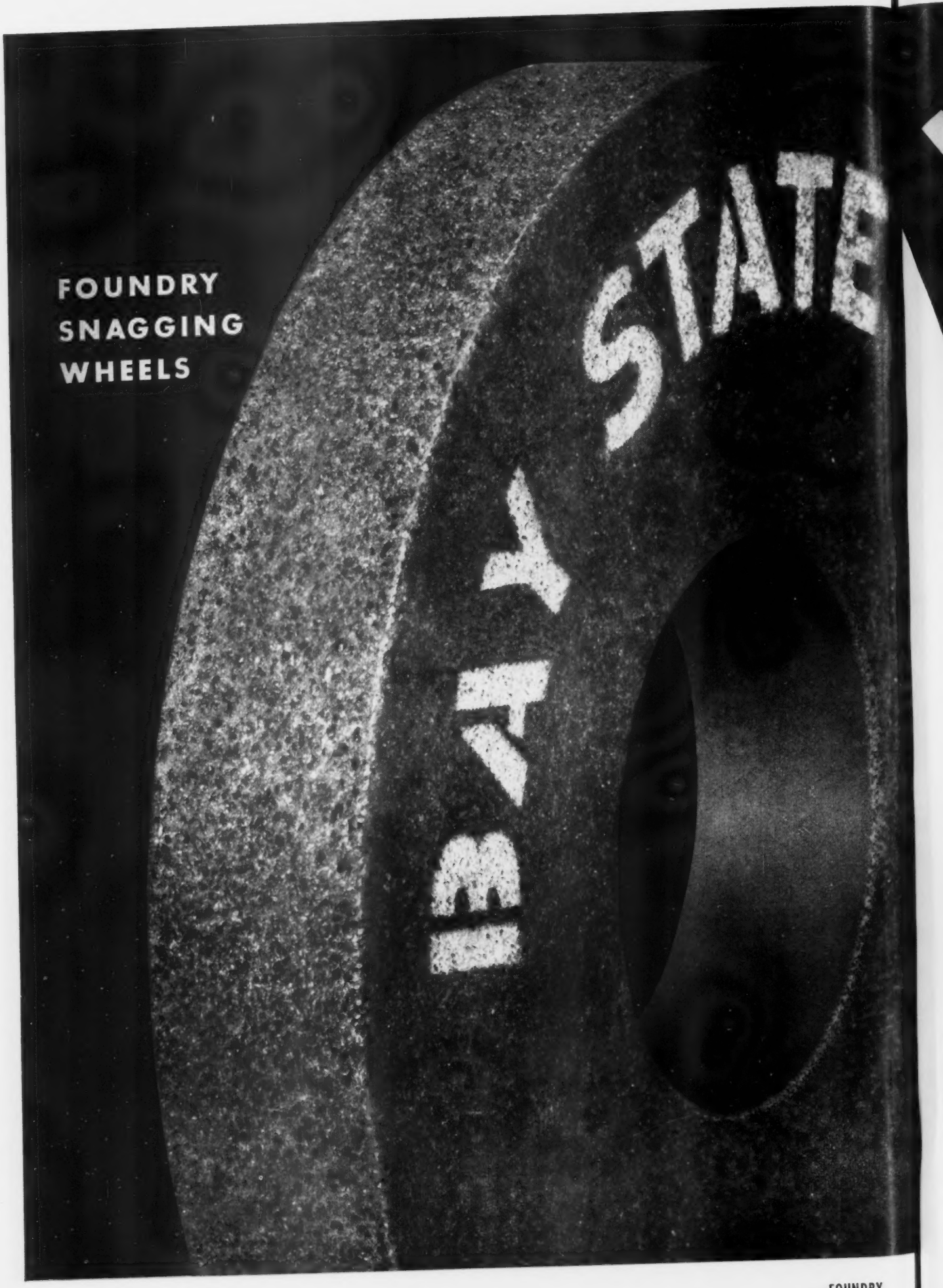
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Foundry Developments

By EDWIN BREMER
Metallurgical Editor

FATIGUE resistance of high-tin babbitt bearings—especially those designed for heavy duty in marine installations—is improved substantially by using virgin tin in block form and by centrifugal casting, according to *Tin News*, published by Malayan Tin Bureau, Washington. Due to their strength and durability, 88 per cent tin babbitt-lined bearings were selected for the main propulsion shafting and turbines of the giant tanker *World Glory* built last year by Bethlehem Steel Co.

Deoxidation procedure

PROCESS for deoxidation of steel and other ferrous alloys is described in U. S. Patent No. 2,705,196. It involves two steps of predeoxidation and final deoxidation. First step uses materials such as ferromanganese, ferrosilicon, silicon-manganese, which are added to the molten bath and allowed to react for a time and until the reaction products rise to the surface. Then final deoxidation is accomplished by addition of such materials as aluminum, calcium, titanium, etc. enclosed in a sealed, thin-walled (0.12 to 0.20-in.) tube or container and held beneath the surface. Process is claimed to result in a steel free from oxide inclusions, a saving in deoxidizing material as well as permitting close control of the addition.

Quick, Watson, the needle

CARBON content of gray iron can be increased appreciably by injection of graphite beneath the surface by use of nitrogen as a carrier, according to C. E. Spangler and Richard Schneidewind in a paper "Increasing Carbon Content of Cast Irons by Ladle Injection" which was presented at the recent meeting of the American Foundrymen's Society. Some of the conclusions given by the authors are that the practice permits substantial and uniform increases in carbon from heat to heat. Calcium carbide can be injected simultaneously with the carbon. Carbon-injected irons behave as normal gray irons with respect to relationship of tensile strength with brinell hardness and composition. Such irons are equivalent in strength to inoculated irons. They have a lower chilling tendency than similar composition irons made by usual methods.

Undercover problem

INVESTIGATION of "Pinholing in Nodular Iron Castings" by J. Gittus and reported in the April issue of *Journal of Research and Development* (Birmingham, England), led to the following conclusions: "Pinholes in nodular castings are subsurface gas bubbles frequently nucleated on sand grains. The effect is aggravated by mold-metal reaction and reduced by the following mold treatments: Additions of pitch (2 per cent) or coal dust (6 per cent); drying the mold. Pinholing also is inhibited by ladle additions of Te (less than 0.002 per cent); Bi (less than 0.004 per cent); Al (less than 0.2 per cent). Where these three elements are employed the metal also must be treated with cerium if a fully nodular structure is required.

Generally the addition of subversive elements is deemed undesirable and should only be considered when other measures fail to produce satisfactory results. Pinholing is most pronounced in castings poured at 2460 to 2500° F—higher or lower temperatures produced less pinholing; in castings of about ½-in. section—smaller and larger sections are less prone to the defect; and in castings containing more than 0.06 per cent residual magnesium. Factors with little or no effect are sand-grain size and clay type; additions of boric acid, of less than 3 per cent coal dust and of less than 1 per cent pitch."

Gives a lift

STUDY of "Sinking under Bosses on Thin Plates: Preliminary Experiments on Foundry Variables" by I. C. Hughes and published in the April issue of *Journal of Research and Development* (Birmingham, England), gives the following conclusions: "In preliminary experiments using green sand molded plates 3/16 and 5/16-in. thick, cast with bosses normally on the top faces of the plates, the following factors were found to promote sinking on the plate faces opposite the bosses: Increased pouring temperature, inoculation with ferrosilicon, soft molds, increased volume of bosses and inversion of the mold.

"At a given pouring temperature inoculation largely eliminated the effect of hard ramming in green sand molds, both hard and soft molded castings showing the maximum depth of sink. In 3/16-in. plates the position in relation to the gate appears to affect the depth of sink, this frequently being a maximum under bosses near to the gate. In a 5/16-in. plate, increasing the gate size decreased the depth of sink. In dry sand molds the depth of sinking was reduced to a minimum when using inoculated iron. Inversion of the casting then had no effect."

Cast dies cut costs

CAST beryllium-copper dies for forging steel, aluminum and magnesium aircraft parts reportedly slashed die cost nearly 75 per cent and reduced aircraft delivery time, according to Beryllium Corp., Reading, Pa. Dies tested in an experimental forging die program now being conducted by North American Aviation Inc. and Wyman-Gordon Co., indicate that recent advances in design and foundry technique now permit casting of beryllium-copper dies in larger sizes and with longer life. At the completion of a production run the cast die can be melted down for subsequent reuse since the stored die pattern is available to produce quickly another die when required.

Goes rolling along

NEW cast steel, heavy-duty wheel for freight cars which has successfully completed an intensive 5 million car-mile test on 14 railroads will go into quantity production at a newly constructed foundry of Southern Wheel Division, American Brake Shoe Co., Calera, Ala. Steel for the wheels has a normal composition of 1.35 to 1.55 per cent TC, not less than 0.50 per cent Mn, not less than 0.15 per cent Si, and not over 0.07 per cent P and S. Melted by the cold-batch process in electric arc furnaces, the steel has a tensile strength of 100,000 to 120,000 psi, elongation of 4 to 6 per cent and a yield point of 60,000 to 70,000 psi. Wheels have a uniform hardness from flange to hub of 245 to 255 brinell.

BASIC NEWS
FOR CUPOLA OPERATORS

Basic Refractories offers field service to foundries

Cupola operators interested in adopting a basic practice can get information and help from Basic Refractories' engineers. These men know refractory application and are familiar with cupola practice.

BASIC SLAG SYSTEMS MAKE POSSIBLE GREATER CARBON PICKUP

A major advantage of basic cupola practice is greater carbon pickup. Carbon in the coke becomes readily available for combustion and absorption by the metal as a result of constant fluxing of coke ash by basic slags. With a given carbon content in the charge—and comparable operating temperatures—carbon pickup of the metal tends to be greater with slags of high basicity.

Another controlling factor of carbon pickup in the basic cupola is temperature. Higher operating temperatures generally result in greater carbon pickup.

Carbon pickup favored by highly reducing conditions

Carbon pickup and desulphurization are closely related in basic cupola practice. And both carbon pickup and sulphur reduction are favored by highly reducing conditions. Basic cupola slags which show a slight oxidizing condition limit carbon pickup and retard desulphurization.

VARIABLES AFFECTING CARBON PICKUP

If carbon analysis of the metal varies, it may be the result of one of the following:

1. Variation in coke ratio, which affects operating temperature,
2. Variation in height of coke bed,
3. Variation in carbon analysis of steel scrap charged.

Variation in coke ratio can occur from day to day without the operator's knowledge if moisture comes in contact with the coke. There have been cases where coke absorbed 15 per cent or more water by weight. If charges are made by weight, this change due to moisture content will affect operating temperature.

A variation in coke bed height can also affect temperature. This height should be maintained by keeping a proper balance between coke charged and melting rate.

With a basic slag system, large amounts of steel scrap are generally substituted for pig iron. Carbon content of this scrap may vary greatly.

Basic linings for cupolas offer 8 advantages

Costs of basic linings and maintenance refractories are higher than those of acid materials. But these costs are offset by the following advantages:

1. **Lower sulphur content in the iron produced.**
2. **Greater carbon pickup.**
3. **Higher metal tap temperatures.**
4. **Use of lower cost charges.**
5. **Absence of bridging and clean drop.**
6. **Better pouring characteristics of metal.**
7. **Less scrap castings.**
8. **Steel scrap can be substituted for low phosphorous pig iron without lowering the total carbon content of the iron.**

View from cupola bottom shows inside cleaned before installing monolithic lining

This view of the cupola illustrates the interior with Gundol lining in place

BASIC REFRACTORIES INCORPORATED

845 HANNA BUILDING • CLEVELAND 15, OHIO

REFRACTORIES ENGINEERING AND SUPPLIES, LTD.—EXCLUSIVE CANADIAN AGENTS

AMERICAN BRAKE SHOE CO., New York, recently acquired Denison Engineering Co., Columbus, O., maker of hydraulic presses, pumps and automatic controls. W. C. Denison, the latter's founder, will continue as president of the company, which will be operated as a Brake Shoe subsidiary. No change will be made in the Denison management or in operations of company plants in Columbus and Delaware, O.

Industrial Heating Equipment Association reports that business for April, 1955, was up 119 per cent over that for April, 1954. For the first four months of 1955, orders totaled $25,589,000, compared with $14,304,000 for the same period last year, a gain of 79 per cent.

Federal Foundry Co.'s plant at 502 South Harris St., Indianapolis 8, was recently acquired by Romos Industries Inc., Cincinnati, which operates a variety of industries. The foundry, owned by Magic Chef Inc., St. Louis, was closed a year ago.

U. S. Hoffman Machinery Corp., New York, has purchased the Intercontinental Mfg. Co., Dallas, Tex., manufacturer of farm and industrial equipment, buses and aircraft components.

Naresco Equipment Corp., Equipment Sales Subsidiary, National Research Corp., Newton Highlands, Mass., has appointed Hainge Co., 3518 Durness, Houston 25, Tex., to be its Gulf Coast sales representative. Hainge Co. will sell the firm's entire line of high-vacuum equipment, which includes high-capacity mechanical pumps and diffusion pumps, vacuum coaters, vacuum furnaces and other machinery.

Duraloy Co., Scottdale, Pa., has been granted an exclusive license for manufacture and sale of the new alloy known as Thermenol, in states east of the Mississippi river, Minnesota, Iowa, Missouri, Arkansas and Texas. Thermenol, developed in the Naval Ordnance Laboratories, White Oak, Md., has high electrical resistance which makes it suitable for heating elements.

Roots-Connersville Blower Division, Dresser Industries Inc., Connersville, Ind., has opened a sales office at 4917 Schaefer Rd., Dearborn 2, Mich. Daniel R. Fulton, for the past 5 years with the Chicago office, will be manager. Prior to establishment of the new office, sales were handled by A. G. Bradbury, who retired because of ill health.

Engineering Cast Products, a nonferrous foundry, recently moved from 8213 McDougall Ave. to 17601 Swift Ave., Detroit.

Wayne Shovel & Crane Division, American Steel Dredge Co., Ft. Wayne, Ind., has appointed four new distributors of its line of crane-excavators. New distributors and their operating territories include Road Machinery Co., Phoenix, Ariz., Arizona; McCall-Gardner Machinery Co., Houston, Tex., eastern Texas; Vermont Road Equipment Co., Montpelier, Vt., Vermont and parts of New Hampshire; and Service Equipment Co., North Miami Beach, Fla., southern Florida.

Koerner & Holl Inc., New York, has been organized as a foundry and machine shop with authorized capital stock of 200 shares, no par value. Anthony Valenti, 401 Broadway, New York, is registered agent. Directors are Charles J. Grella, 92-27 Gettysburg St., Bellarose, N. Y.; William Knecht, 65 West 192nd St., Bronx, N. Y.; and Morris Goldstein, 1958 77th St., Brooklyn, N. Y.

Teer, Wickwire & Co., Jackson, Mich., have purchased the Lindberg Air & Hydraulic Cylinder Division of Lindberg Engineering Co., Chicago, and will operate it as a division. The purchase covers the entire stock, machinery, designs and development of the former Lindberg division.

Robertshaw-Fulton Controls Co., Greensburg, Pa., producer of automatic control devices, has renamed its American Thermometer Division, St. Louis. Effective May 1, the division will be called American Controls Division. The new name is expected to identify the company more closely with its products.

M & E Mfg. Co., Indianapolis, has purchased the paint spray business of Kellogg Division, American Brake Shoe Co. The purchase involves all patents, designs, tools, equipment and material connected with the Kellogg-American spray line. No real estate was involved.

Otto H. Rosentreter Co., 8411 State St., South Gate, Calif., is handling the sales of equipment manufactured by Shell Process Inc., Chicopee, Mass. Its territory covers California, Washington, Oregon, Idaho, Utah, Nevada and Arizona.

Foxboro Co., Foxboro, Mass., has established ten regional sales divisions to increase its instrument sales

NEW PLANT, NEW NAME: Ohio Pattern & Mfg. Co., Toledo, O., has moved from Monroe St. to a newer and larger plant at 2512 Albion St. Ohio Pattern formerly was called Dewey Pattern Works. Coincidentally with the name change, the firm became a division of Washtenaw Pattern Co., Wayne, Mich., but no change in ownership or company officers is involved in the reorganization. New general manager of the company is M. J. Giles, who previously held the same post at Washtenaw Pattern

Miller AIR CYLINDERS

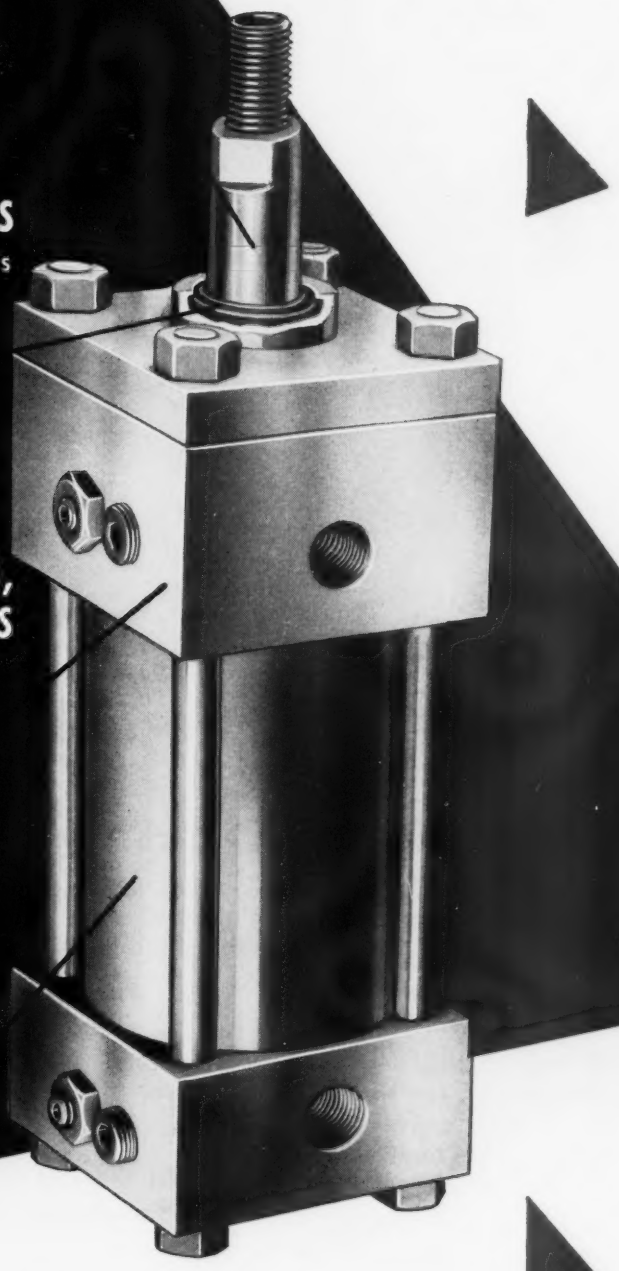
Ideal For Toughest Foundry Service!

ARD
HROME PLATED
ISTON RODS
revent Scratch-Damage,
icks and Rust

IRT WIPER SEALS
otect Rods, Seals, Bushings

OLID STEEL HEADS,
APS and MOUNTINGS
iminate Breakage

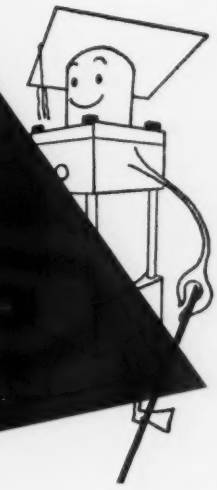
RASS BARRELS
liminate Rust and Corrosion



Hardchrome plated, heat treated, stress relieved solid steel piston rods protected by dirt wiper seals provide long cylinder life under severest abrasive conditions "TEFLON" Seals for high temperatures

Most complete air cylinder line ever offered for heavy-duty foundry service 1½" through 20" bores, 19 mounting styles, strokes up to 22 ft., cushioned and non-cushioned.

These Air Cylinders feature the SPACE-SAVING SQUARE DESIGN originated by Miller in 1945 and fully met the J. I. C. Pneumatic Standards years before their adoption in 1950.

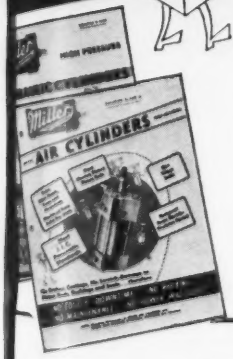


Immediate Delivery From "Stock"

Over 4,600 different air cylinder selections—from 1½" through 8" bores, 1" through 36" strokes in 17 mounting styles—available for *immediate shipment* on order.

Miller Hydraulic Cylinders and Air-Oil Boosters also in stock for immediate delivery.

Write for Complete Catalog and Stock List!



WRITE FOR CYLINDER BULLETINS A-105 and H-104

Complete Miller cylinder line includes: air cylinders, 1½" to 20" bores, 200 PSI operation; low pressure hydraulic cylinders, 1½" to 6" bores for 500 PSI operation, 8" to 14" bores for 250 PSI; high pressure hydraulic cylinders, 1½" to 12" bores, 2000-3000 PSI operation. All mounting styles available.

SALES AND SERVICE FROM COAST TO COAST

LEVELAND • YOUNGSTOWN • DAYTON • PITTSBURGH • PHILADELPHIA • OSTON • HARTFORD • NEW YORK CITY • BUFFALO • ST. PAUL • GRAND APIDS • DETROIT • FLINT • FORT WAYNE • SOUTH BEND • INDIANAPOLIS • MILWAUKEE • LOUISVILLE • KANSAS CITY • SEATTLE • LOS ANGELES • AN FRANCISCO • BALTIMORE • DENVER • ST. LOUIS • MOLINE • CHICAGO • HOUSTON • TORONTO, CANADA and OTHER AREAS

MILLER FLUID POWER CO.
(Formerly MILLER MOTOR COMPANY)

Miller 2034 N. HAWTHORNE AVE., MELROSE PARK, ILL.

AIR & HYDRAULIC CYLINDERS • BOOSTERS • ACCUMULATORS

MATHEWS

Engineers and Builders of Conveyers and Conveyer Systems for American and Canadian Industry for 50 YEARS . . .

● It was just 50 years ago, in 1905, that the first Mathews Conveyers were designed and built—and applied in a Minnesota warehouse. From that early equipment has evolved some very spectacular continuous-flow conveying systems—indeed, some of the real "show jobs" of the conveying industry.

In these 50 years, Mathews engineers have developed the most complete line of gravity and power conveyers and special conveying machinery to be found anywhere—to serve the foundry industries in the United States and Canada.

Whatever is required—standardized conveyer units or a complete system —you'll find that Mathews is your best bet. Three modern plants. Engineering sales offices and standardized conveyer distributors located in most principal cities.

50th Anniversary
MATHEWS CONVEYERS
1905-1955

GENERAL OFFICES . . . . ELLWOOD CITY, PENNSYLVANIA
PACIFIC COAST DIV. MATHEWS CONVEYER COMPANY WEST COAST
SAN CARLOS, CALIFORNIA
CANADIAN DIVISION . . MATHEWS CONVEYER COMPANY, LTD
PORT HOPE, ONTARIO

Engineering Offices or Sales Agencies in Principal American and Canadian Cities
Export Representative—Foreign Trade Division of New York Hanseatic Corporation

engineering coverage. Offices and regional managers are: New England, H. H. Michelmore; New York, E. R. Huckman; Philadelphia, J. B. Deaderick; Pittsburgh, A. H. Shafer; Atlanta, E. W. Prendergast; Cleveland, H. L. Lee; Chicago, J. J. Connelly; Dallas, Tex., E. L. Stark; Houston, Tex., L. W. Parten; and San Francisco, R. E. Rogers. In charge of the divisions are H. O. Ehrisman, general sales manager, and J. J. Burnett, field sales manager.

Davey Compressor Co., Kent, O., will be acquired by Twin Coach Co., there, subject to an agreement of officers and directors. Davey Compressor Co., established in 1929, will operate with present personnel as a wholly-owned subsidiary of Twin Coach Co., producer of trucks, engines and specialized automotive vehicles.

Gowanus Bronze Foundry Inc., 562 West Hoffman Ave., Lindenhurst, N. Y., has been granted a charter of incorporation listing 200 shares of capital stock at no par value. Incorporators are Robert B. and Billie J. Loew, Old Country Rd., RFD No. 2, Huntington, N. Y., and Gerald L. Dellasal, 1522 55th St., Brooklyn, N. Y.

Medmast Corp., 17 Court St., Buffalo, has been formed as a foundry supply company, with authorized capital stock of 200 shares, no par value. Directors are Minnie Potosky, E. M. Sutton, and Walter Brock, all of Buffalo. Registered agent of the corporation is Maurice Yellen, 17 Court St.

Wilton Tool Mfg. Co. has moved to its new general office and factory building at 9525 Irving Park Rd., Schiller Park, Ill. The plant, recently completed at a cost of $500,000, has a total of 68,000 sq ft of floor space. Hugh W. Vogl is president of the company.

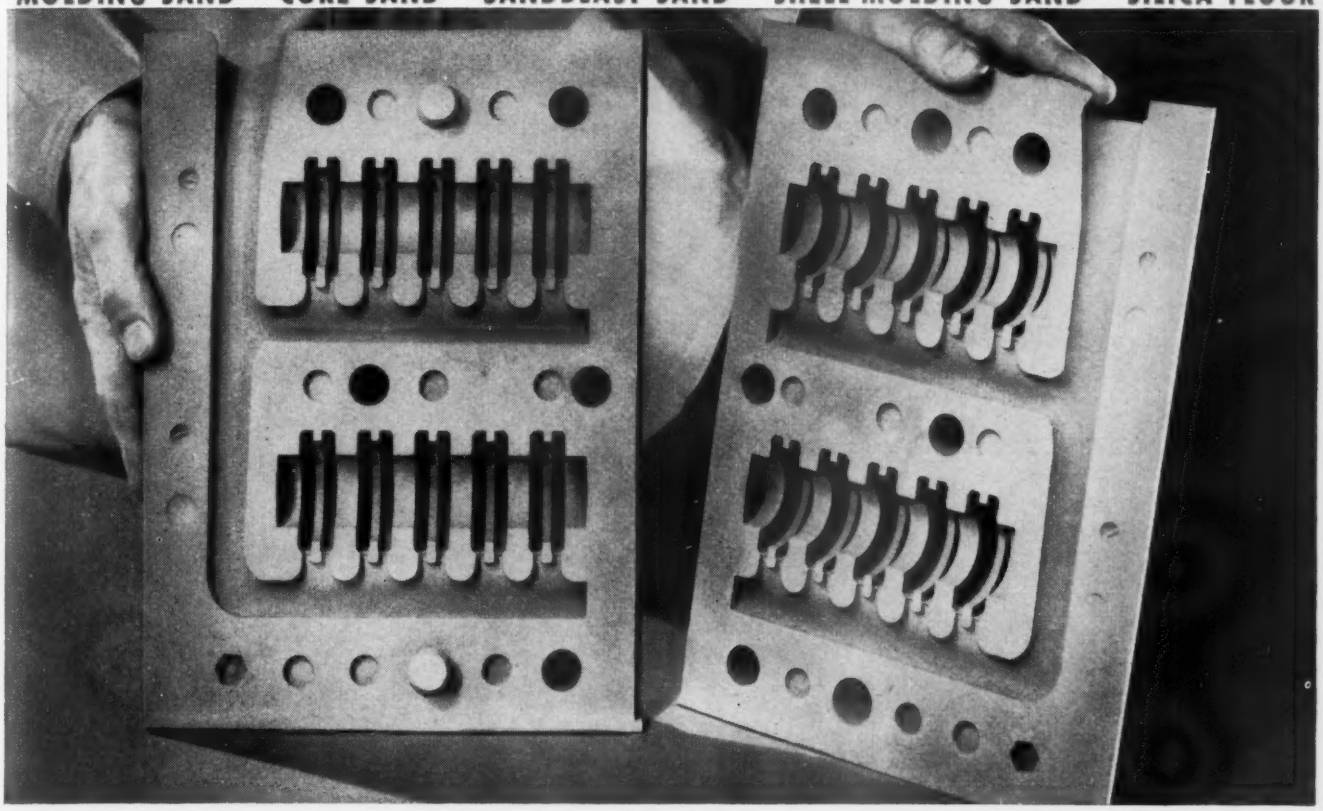
Norton Co., Worcester, Mass., has moved its Los Angeles district office to 5905 Pacific Blvd., Huntington Park, from 4890 South Alameda St., Los Angeles. Robert W. Cushman is West coast district manager.

El Reno Foundry, formerly located at 420 North Macomb St., El Reno, Okla., has changed its name to Charles Barker Foundry, and is now located at 216 South Second St., Chickasha, Okla.

Thermal Research & Engineering Corp., Conshocken, Pa., has appointed William Neundorfer district sales en-

Quality Silica Products . . . since 1868

MOLDING SAND • CORE SAND • SANDBLAST SAND • SHELL-MOLDING SAND • SILICA FLOUR



You can't do better than the best...

Shell-Molding PENN-SAND

The best in the foundry is the sand that can be depended upon to produce the most flawless castings, time after time. Here's how Shell-Molding PENN-SAND can give you consistently better castings at low cost:

WIDE SCREEN DISTRIBUTION
—results in castings of exceptional finish, gives excellent permeability, eliminates gas problems.

LOW CONFINED EXPANSION
—aids mold stability, reduces rejects.

HIGH REFRACTORINESS
—facilitates pouring, prevents surface defects.

ABUNDANT SUPPLY
—insures immediate shipment of your orders.

LOW COST
—priced economically for bulk and bagged shipments.

For further information and free samples, fill out and return the coupon below. And remember—PENN-SAND is the sure start to a *perfect* finish.

PENN PGS SAND

THE SURE START TO A PERFECT FINISH

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Please send me, without obligation, samples and more details on Shell-Molding PENN-SAND.

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Pouring magnesium at Superb Light Alloys Inc., Farmingdale, N. Y.

...WITH *Borden's new* Shell Mold Resin

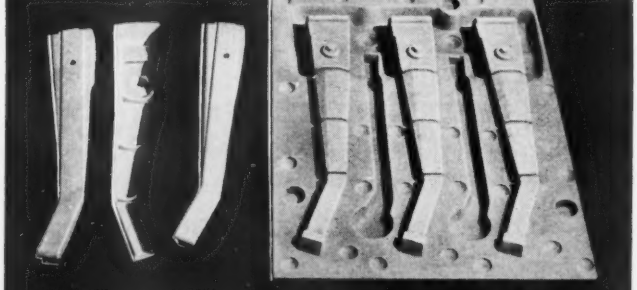
To meet the demand for high dimensional stability and smooth finish in magnesium castings of high-fidelity pickup arms . . . The Superb Light Alloys Inc. decided to use the modern shell mold process.

Then—to help form the best shell molds possible for their casting . . . these progressive foundry operators selected Borden's new THOR MCF-7 resin.

That's because THOR MCF-7 assures a full thickness build-up—even on regular and vertical pattern surfaces. It produces a flat, rigid shell without warpage. And it strips off the pattern cleanly and easily.

Perhaps Borden's THOR MCF-7 resin in your shell mold process can help increase your production and solve many of your casting problems. If you'd like a trial run—have a Borden technical expert assist you. Write The Borden Company, Chemical Division, Dept. F-75, 350 Madison Ave., New York 17, N. Y.

UREA AND PHENOLIC RESIN CORE BINDERS * SHELL MOLD RESINS * CORE SPRAY * CORE PASTE * PARTING AGENTS



Magnesium pickup arms and section of shell mold showing exceptional smoothness and dimensional accuracy.

FOUNDRY RESINS

© T. B. C.

THE *Borden* COMPANY

CHEMICAL DIVISION

Obituary

GUSTAF A. LILLIEQVIST, 61, since 1943 research director, American Steel Foundries, Chicago, died May 31. A native of London, he came to the United States following graduation from University of Berne, Switzerland in 1924, and was appointed chemist at the Granite City, Ill., Works, American Steel Foundries. In

GUSTAF A. LILLIEQVIST

1927 he was transferred to the East Chicago, Ind., laboratory, and in 1941 was named assistant works manager and chief metallurgist of the Indiana Harbor Works. Mr. Lillieqvist had been a member of the metallurgical advisory committee on cast armor for the Ordnance Department and a member of the technical committee of the Munitions Board. Active in committee work in many technical organizations, he received the Technical and Operating Medal of the Steel Founders' Society of America in 1952. In 1933 he was cited with the R. W. Hunt Award of the American Institute of Mining and Metallurgical Engineers.

* * *

James A. Slater, for 58 years associated with National Malleable & Steel Castings Co., Cleveland, died May 28. He joined the company as an office boy and successively became Cleveland sales agent, manager of railway sales in Chicago, assistant manager of sales and general sales manager. Mr. Slater was elected a vice president in 1934, a director in 1937, and from 1945 until he retired in March, had been assistant to the president of National Malleable & Steel Castings Co.

* * *

Harry J. Sprecken Sr., 71, chairman of the board of directors, Sturgis Foundry Corp., Sturgis, Mich., died May 17. Mr. Sprecken joined the Chicago Tractor Works of International Harvester Co. in 1922 as superintendent of the gray iron foundry and in 1930 became superintendent of all of its automotive foundries. He retired from International Harvester in 1948.

* * *

Stephen M. Swain, 51, for the past year vice president-research, North American Refractories Co., Cleveland, died May 22. A graduate of New York State College of Ceramics, he joined the company in 1934 and became director of research of National Refractories in 1940.

* * *

John T. Zayner, 46, assistant metallurgist, Manufacturing Research Branch, International Harvester Co., Chicago, died May 13.

* * *

Otis L. Jones, 76, who retired in April as president, Illinois Clay Products Co., Joliet, Ill., died May 13. Mr. Jones had been president of the company since the time it was founded, in 1911.

* * *

Lloyd J. Scott, 66, general purchasing agent, Griffin Wheel Co., Chicago, died June 5. He had been associated with the company for 45 years.

Gregory F. Fay, president, Fay Foundry Corp., Syracuse, N. Y., died May 17, after a long illness. A native of Syracuse, Mr. Fay was a graduate of Syracuse University, where he majored in metallurgical engineering.

* * *

Chester J. Walter, 50, executive vice president, Buffalo Pattern Corp., Buffalo, died May 30. A native of Buffalo, after graduation from high school he joined the company, founded by his father in 1890.

* * *

C. McLeod Lewis, 61, president, Badger Malleable & Mfg. Co., South Milwaukee, Wis., died May 11. He joined the foundry in 1916, following graduation from University of Wis-

C. MCLEOD LEWIS

consin, and became president in 1949 after 12 years as secretary-treasurer. Mr. Lewis was the son of the late Harry M. Lewis, who helped found the company in 1908. He was a former director of the Malleable Founders' Society.

* * *

Clarence A. Vanderpool, 65, owner and manager of C. A. Vanderpool Laboratory, Milwaukee, died June 5, in Miami Beach, Fla.

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gineer in charge of the company's newly established Cleveland area office, at 2000 Warrensville Center Rd. Thermal manufactures specialized combustion and heat transfer equipment.

Electric Controller & Mfg. Co., Cleveland, has opened an office and sales engineering branch at 530 El Camino Real, San Carlos, Calif. John L. King, formerly with T. R. Routh Co., which served Electric Controller & Mfg. Co. in the area, is joining the latter firm to operate the new office.

Western Metal Co., Chicago, has appointed Charles Wagner, Wagner Metal Co., 18746 Lindsay Ave., Detroit, to be its exclusive agent for the sale of brass and aluminum ingot in the Detroit area.

Lester B. Knight & Associates, consulting engineers, have moved to their own building at 600 West Jackson Blvd., Chicago.

Rockwell Mfg. Co., Pittsburgh, has changed the name of its Canadian subsidiary at Guelph, Ont., from Callander Foundry & Mfg. Co. to Rockwell Mfg. Co. of Canada, Ltd. Rockwell purchased the Canadian firm in 1953.

Hyster Co., 2902 N. E. Clackamas St., Portland 8, Oreg., has appointed Miller Equipment Co., 538 Bond Ave., Grand Rapids 2, Mich., to handle sales and service of its trucks and mobile cranes in western Michigan.

Leschen Wire Rope Division, H. K. Porter Co., St. Louis, has moved its New York district office and warehouse to 219 Emmet St., Newark, N. J.

the new HERMAN stationmaster

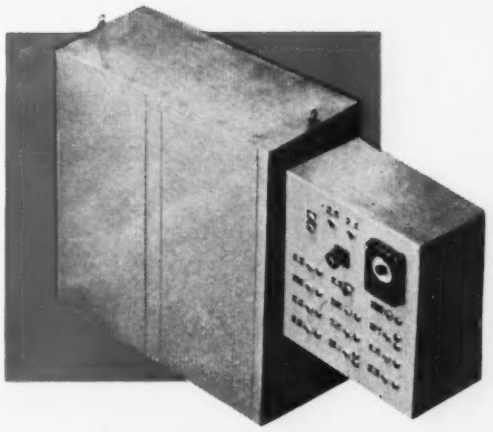
HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH 22, PA.

Here . . . once again . . . a new HERMAN Molding Machine to enhance your production operation.

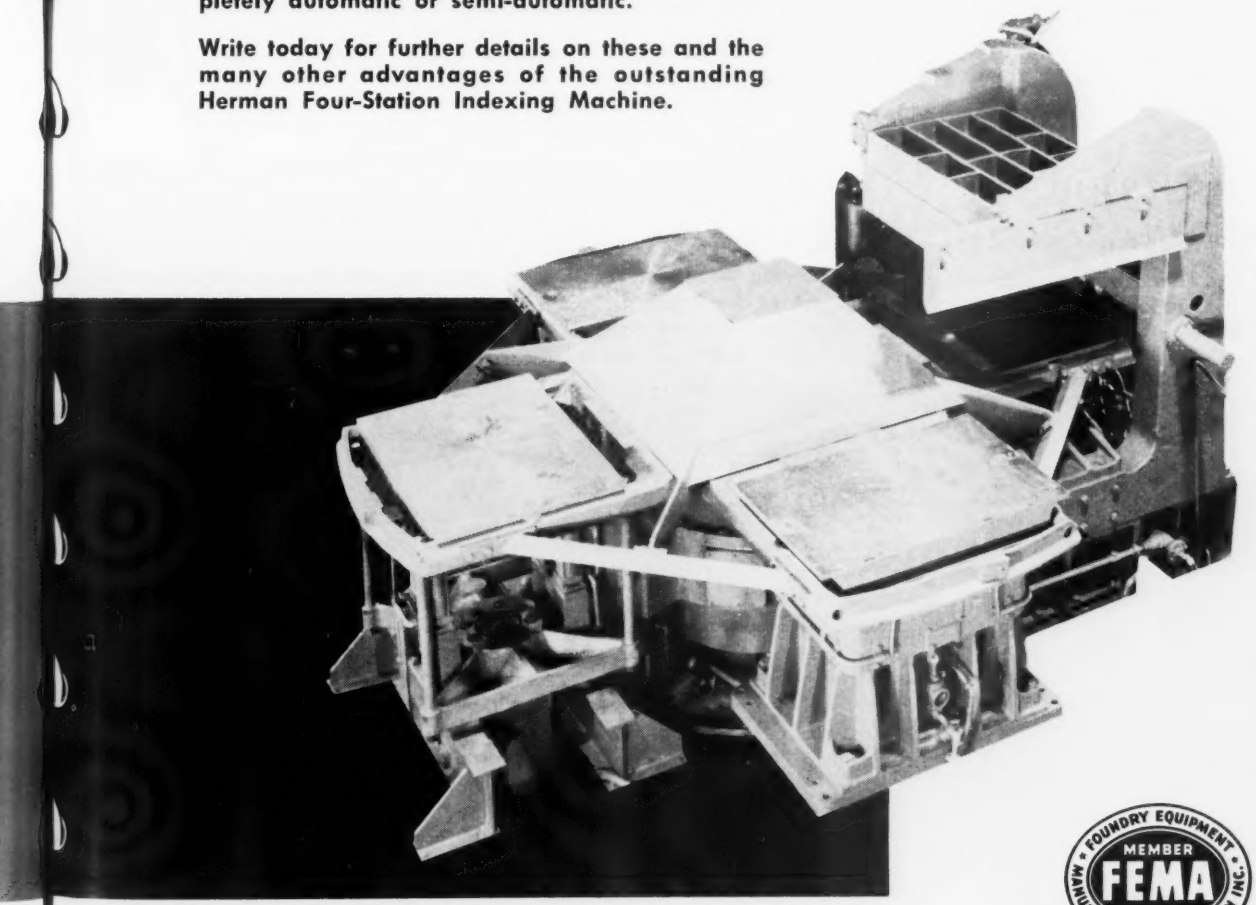
Our latest Stationmaster Indexing-Type Jolt, Squeeze, Strip Machine efficiently distributes the necessary molding operations between *four stations* . . . flask placing, filling and jolting, squeezing, and stripping. Each station operates simultaneously, providing increased cycle speed and higher production.

Stationmasters are built to produce flask sizes from 20 x 24″ to 42 x 48″. An adjustable bunter control valve insures proper jolt. Squeeze pressures are adjustable to a maximum, and the squeeze piston has a limit stop. Strike-off bar is adjustable. Automatic indexing with adequate registrations assures accurate location of flasks at all positions. The Stationmaster can be completely automatic or semi-automatic.

Write today for further details on these and the many other advantages of the outstanding Herman Four-Station Indexing Machine.



Note the simplified, compact automatic or semi-automatic controls.



FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

HERMAN

Best Known Name in Molding Machines

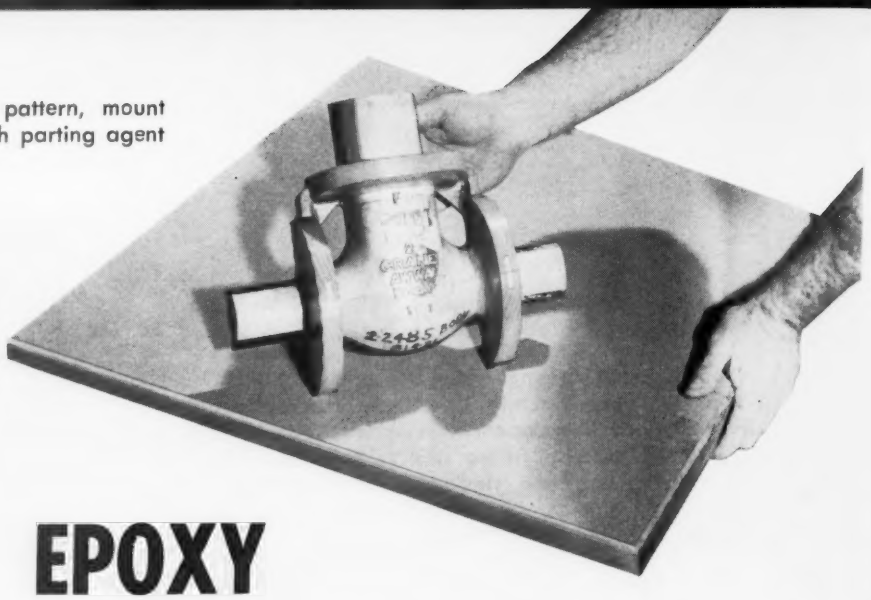


Fig. 1—First, prepare conventional pattern, mount it in a wooden box and spray it with parting agent

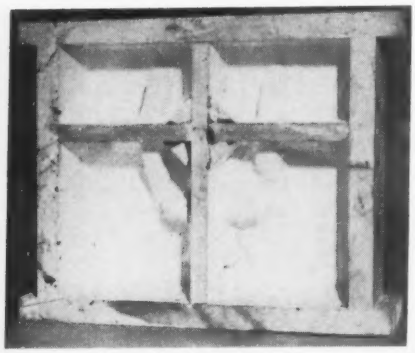


Fig. 2—Underside of mold after several layers of glass cloth and epoxy mixture have been applied and cured

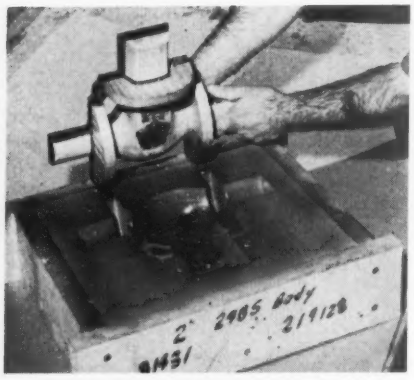


Fig. 3—Pattern has been drawn. Observe faithful reproduction of the mold and smoothness of its surfaces

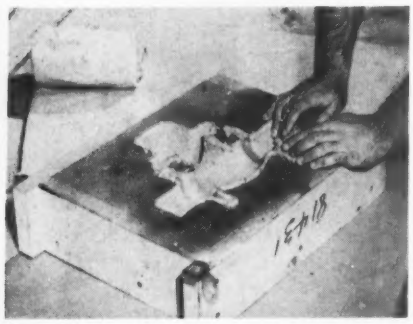


Fig. 4—A ¼-in. layer of caulking compound is laid up all around the inside, up to the face of the mold

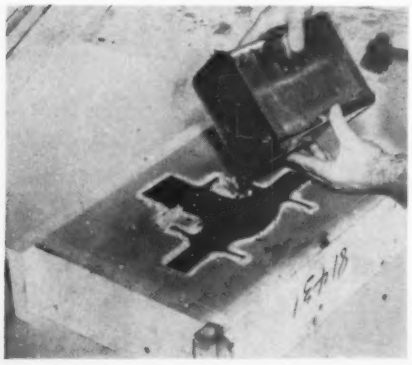


Fig. 5—Resin, with a suitable hardening agent, is poured into caulked mold and allowed to cure for a day

EPOXY PATTERNS

Give Easy Draws, Long Life

By O. E. FIEROH
Superintendent
Tool & Pattern Dept., Crane Co.
Chicago

SOMETHING new in the foundry field is saving time, unnecessary effort and money for Crane Co., Chicago. This new development is epoxy resin patterns.

The tool and pattern department at Crane has experimented with many materials, hoping to come up with one which would make superior patterns by eliminating individual shortcomings of other materials. This search for better methods, new materials and improved products is a basic policy at Crane Co., which is celebrating its centennial this year. Started in 1855 as a one-man foundry supplying lightning rod parts, the company has grown until today it operates one of the largest modern pattern shops in the country.

Two years ago, we heard about the use of epoxy resins in tools and dies, felt that they might also make tough, long-lasting patterns and decided to try them out. Experience so far indicates that these resins, alone or reinforced with woven glass, are eminently satisfactory for all kinds of duplication work. We have used them for a wide variety of duplicate patterns for castings ranging in size from a small, simple valve to a large boiler section with complicated contours and deep draws. In each instance the epoxy-based patterns have proven their worth. And according to Dale Knepp of Kish Resin Inc., suppliers of the tool and die formulations, other foundries have tried the epoxies with equal success.

Making Epoxy Duplicates — The first step is to prepare a suitable wooden or metal working pattern (Fig. 1), similar to those used by the foundry. This pattern is mounted on a bottom board, and a wood frame is inverted over it. The pattern then is sprayed and waxed with a suitable parting agent to prevent the liquid resin from sticking to it.

A laminating resin formulation made by Shell Chemical Corp. and marketed under the trade name Epon is mixed with an appropriate curing agent in a disposable container, such as paper cups. Because pot life is only some 25 minutes once the curing agent has been added, we mix only suitable quantities at a time.

The mixture is brushed over the pattern and a small section of the bottom board surrounding it. The formulation is allowed to sit until it is no longer tacky—about 15 to 30 minutes, depending on room tem-

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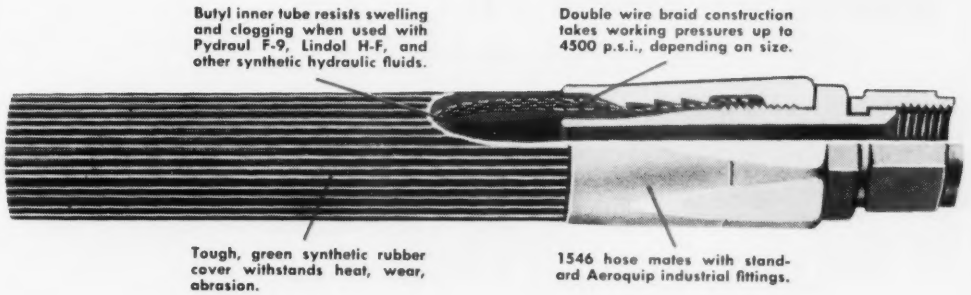
New! Aeroquip 1546 High Pressure Hose for FIRE-RESISTANT Hydraulic Fluids


Butyl inner tube resists swelling and clogging when used with Pydraul F-9, Lindol H-F, and other synthetic hydraulic fluids.
Double wire braid construction takes working pressures up to 4500 p.s.i., depending on size.
Tough, green synthetic rubber cover withstands heat, wear, abrasion.
1546 hose mates with standard Aeroquip industrial fittings.

Highly recommended wherever hydraulic lines are used in plant "hot spots" are the new synthetic, fire-resistant hydraulic fluids. Aeroquip's new 1546 hose has been specially developed to carry these synthetic fluids without swelling or clogging.

The money-saving opportunities are immediate, because increased plant safety means reduced fire insurance premiums in many instances.

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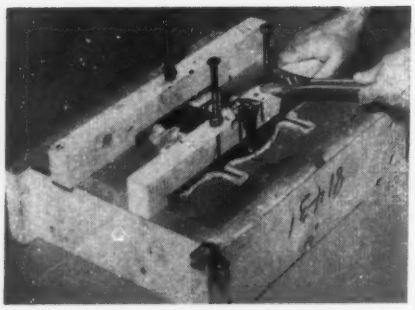

Fig. 6—Bolts imbedded in resin help to remove core. Cores are relocated in same position by use of crossbars

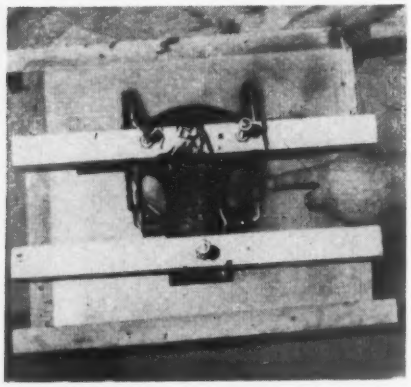

Fig. 7—When core is properly positioned, ¼-in. gap between core and mold is left where caulking had been

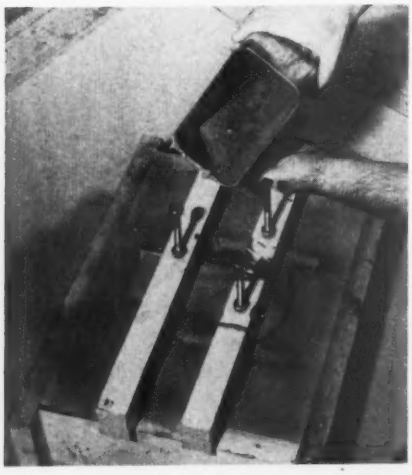

Fig. 8—Second resin mix, with aluminum oxide and hardener, is poured into the space between core and mold

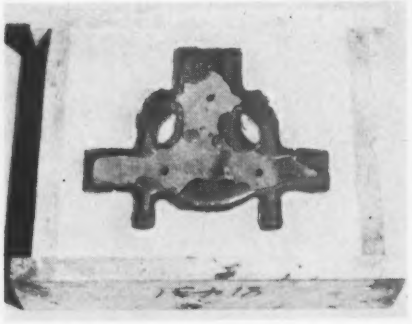

Fig. 9—Duplicate is left to cure at least 4 hr, often overnight. View shows finished pattern still in mold

perature, usually will be sufficient.

Another coat of the same formulation then is applied. After it has gelled, two or three layers of resin-impregnated glass cloth are draped over the pattern. Care must be taken to fill all fillets, radiuses and indentations. More epoxy formulation then is brushed on.

These two steps are repeated until the buildup is about 3/16 in. Final thickness depends on the size and the nature of the pattern (Fig. 2). The mold is left to cure for ½ to 1 hr at room temperature, after which the pattern is removed (Fig. 3). The mold then is prepared for casting a duplicate of the original pattern.

Fig. 10—Duplicate plastic pattern has been removed, is ready for use. Mold can be used over and over again

A plastic core containing iron oxide fillers is needed to cast the duplicate. In the preparation of this core, the mold serves as a corebox. A ¼-in. layer of caulking material is laid up all around the inside, up to the face of the mold (Fig. 4), and a parting agent is applied. An epoxy-based core formulation is poured into the mold up to the mold face (Fig. 5). After a 24-hr cure, the core is removed (Fig. 6) and sandblasted or scraped. It then is ready for use in the next step.

After the core has been removed, the caulking material is cleaned out of the mold, and the latter's surfaces are waxed and covered with a parting agent. The core is suspended in the mold with a ¼-in. air space all around (Fig. 7), where the caulking was previously. A different epoxy formulation, including curing agent and aluminum oxide filler, is poured into this space (Figs. 8 and 9). The mold is left to cure for at least 4 hr, often overnight.

As the last step, the cured casting is removed from the mold (Fig. 10). Because epoxy casting resin yields a dense, smooth surface, very little finishing is necessary. The mold can be reused for additional duplicates.

Advantages of Epoxy Patterns—In addition to enabling us to make as many duplicates as we want in the shortest possible time, epoxy patterns offer several other advantages. First of all, they are exceptionally smooth. Because sand will not stick

Fig. 11—When the master pattern has been removed from the mold, other epoxy casting resins are used to make duplicates. Latter shrink 0.0001-in. per in.

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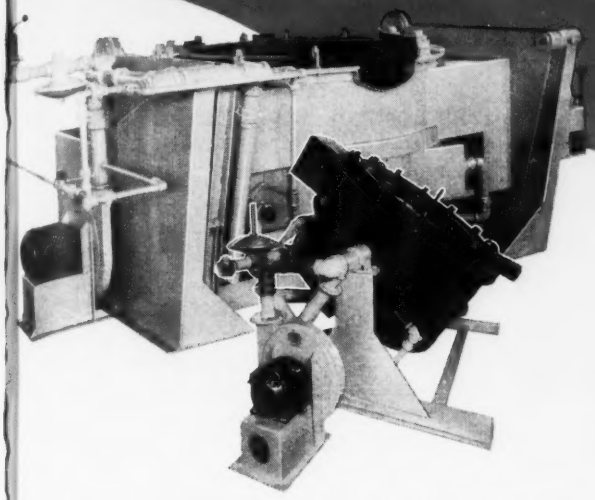

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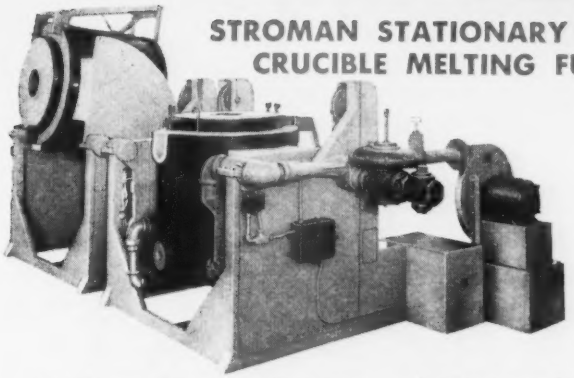

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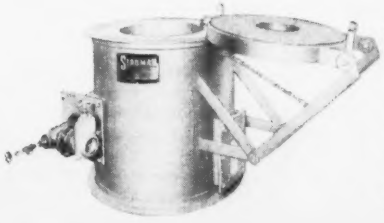

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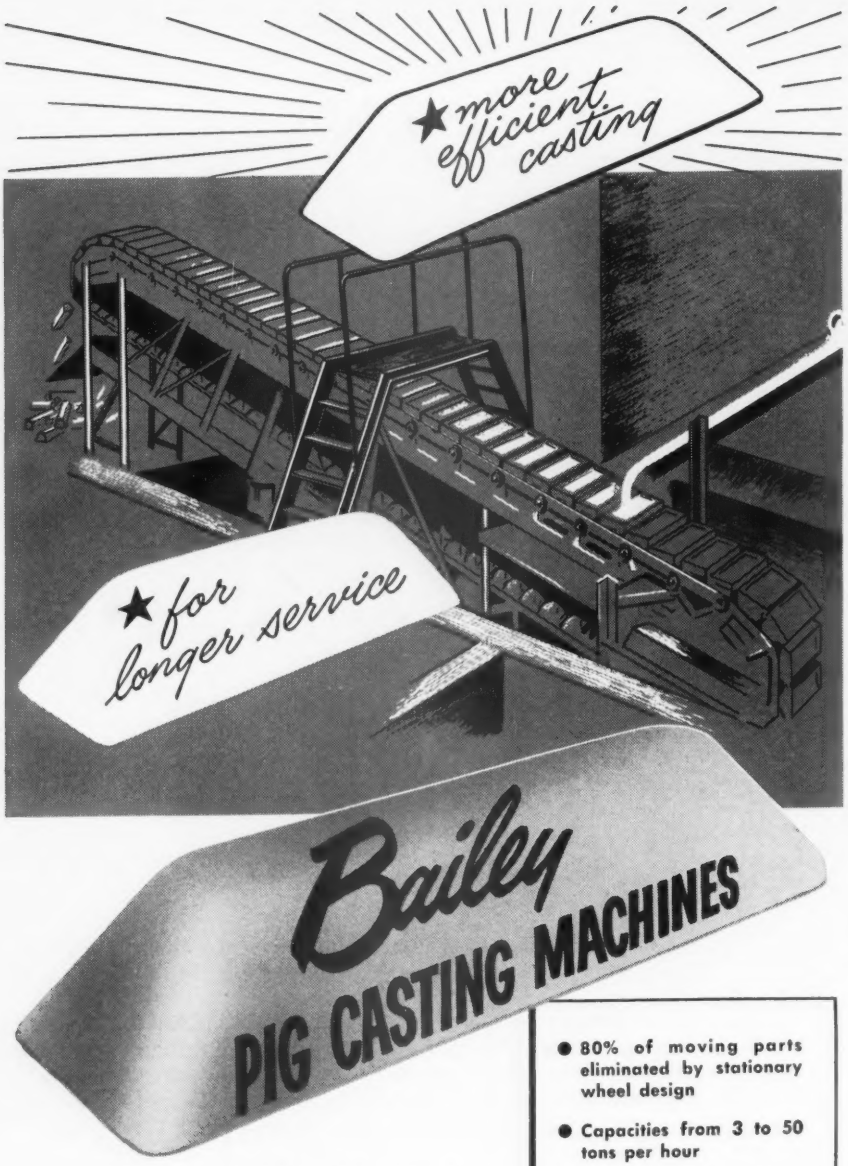

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Foundries and small capacity metal producing operations particularly benefit from the simplified design of these machines. The unique stationary wheels are the basic reason why the machines assure much more efficient casting and far longer service. In this design the idler wheels are mounted on the frame, rather than on the moulds, thus keeping them as far as possible from the hot metal. Completely self-contained, the unit includes the machine proper, a motor gear unit, and a variable speed reducer and drive.

WILLIAM M. Bailey COMPANY
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LEADERSHIP THROUGH QUALITY
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to the cured resin, we seldom disturb the mold when drawing the pattern. This lack of adhesion to sand has eliminated broken molds in our foundry.

Second, epoxy patterns stand up better than many other types, especially when used in jolt rammers and squeezer machines.

Third, the glass-reinforced epoxy formulation we use results in a pattern which may be changed or repaired easily. If a mistake has been made in the construction of the original pattern, the duplicates can be corrected either by machining off any excess or by simply adding additional material where needed. "New" plastic can be fused perfectly to the cured pattern without a visible line of demarcation.

Fourth, costs have dropped considerably since we started to use plastic patterns, and we have built many different types and sizes. On small parts we may make up to 12 duplicates—on larger parts perhaps 2 or 3. Medium-sized runs also can be made from epoxy resin tools. The longest production run we have made from any one epoxy pattern has been about 5000 castings.

Fifth, we can make duplicates quickly and to close tolerances. Because shrinkage of the cured plastic is only 0.0001 in. per in., no shrinkage allowances are necessary with epoxy duplicates.

Builds Titanium Pilot Plant

National Research Corp., 70 Memorial Drive, Cambridge 42, Mass., has received a contract for $1,183,495 from the General Services Administration to finance construction and operation of a demonstration pilot plant for production of titanium metal by a new nonKroll process developed by the company. Being designed for 1000 lb of metal per day, the plant will be housed in a building being erected near the site of National's Equipment Division, in Newton, Mass.

Foundry Film Available

Expert craftsmanship in the foundry and machine shop as it was practiced in the 18th century is the central theme of "The Spiked Candlestick," a new 16-mm color film offered by Virginia Metalcrafters, Waynesboro, Va. Running time is 13½ minutes and the film is available without charge to interested organizations. Film depicts the manufacture of an authentic colonial Williamsburg reproduction.

(Advertisement)

NEW ALUMINUM CEMENT

Shrinks less then 3/10 of 1%

Metalset A201 being applied to an aluminum casting.

Because of the need for an aluminum cement which won't crack when hardening in thick applications, we have received more than 4,000 inquiries about Metalset A201, announced here and elsewhere a few months ago.

Our iron cements have been advertised in *Foundry* for 58 years. This month we'll borrow the space to answer questions about the new product.

Q. *Just what is Metalset A201? How does it differ from other metallic cements?*

A. Metalset A201 is an epoxy resin, compounded with aluminum and other materials. In its native state it handles like putty. But when you add a curing agent it hardens at room temperature.

Q. *What is it used for?*

A. It fills holes and builds up surfaces.

Q. *Why a curing agent? Some other cements harden on exposure to air.*

A. The curing agent makes the cement harden *chemically*. There is no solvent to evaporate and cause cracking. Shrinkage is kept to less than 3/10 of one percent, and Metalset can be applied in any thickness.

Q. *Doesn't the aluminum make it hard to mix?*

A. No, the aluminum is completely suspended. Metalset A201 is no harder to mix than molasses.

Q. *What is the purpose of combining aluminum with the epoxy resin?*

A. The aluminum makes it more machinable. The hardened product can be drilled, tapped, sanded, polished, right down to a feather edge. The aluminum also gives it the proper color to mate with aluminum, zinc, or stainless steel castings and parts. Metalset A201 is "thixotropic"— like a putty, it is immobile when applied to a vertical surface.

Q. *You say the product hardens. How hard?*

A. The Barcol hardness of fully cured Metalset A201 is 38.

Q. *Is the material adhesive? Or does it cling by expansion like your iron cements?*

A. Metalset A201 is very adhesive; sticks to any metal, wood or glass.

Q. *What is the pot life of Metalset A201?*

A. That depends on temperature and quantity. Curing can be accelerated with low heat or retarded by reducing the amount of mixed materials. In general, you mix only what you expect to use within a short time.

Q. *How do we measure the amount of curing agent?*

A. It comes already measured for whatever quantity has been purchased.

Q. *How does Metalset A201 stand up to temperature, water, acids, and alkalies?*

A. Metalset A201 can be used at temperatures up to 300° F. It is not affected by water. It resists acids and alkalies, particularly the latter.

Q. *You keep talking about A201. Are there other kinds of Metalset?*

A. We have two other standard Metalset items, made especially for casting and embedding—Metalset A305 (which requires a heat cure) and Metalset A306 (which hardens at room temperature).

Q. *How do these casting compounds differ from Metalset A201?*

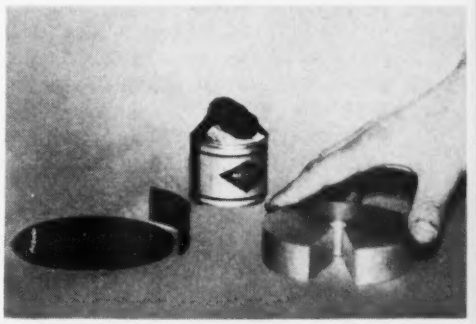
A. They flow. They will reproduce the most delicate detail, and are used to make duplicate patterns, vacuum-forming molds, jigs and dies.

Q. *You speak of "standard Metalset". Do you also make special compounds?*

A. We can formulate to meet special requirements if the quantity is sufficient.

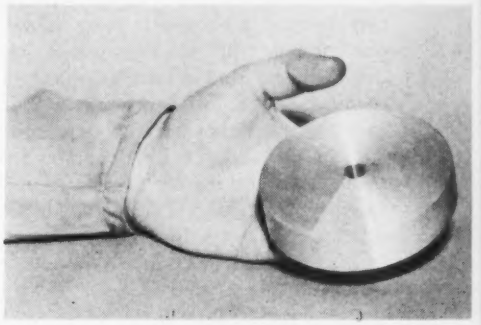
Q. *Where can I get Metalset?*

A. We expect that in due time all Smooth-On distributors will stock it. In the meanwhile, either order through your supply house or direct from us. Prices are as follows: 2 oz. unit, $.50; 6 oz. unit, $1.25; 1½ lbs., $3.25; 3 lbs., $5.90—all f.o.b. the factory.



To illustrate machinability and lack of shrinkage, we cut a wedge shape from this 1½" thick aluminum disc.

Wedge-shaped hole is filled with Metalset.



Metalset "repair" hardened and machined.

We will be glad to send descriptive literature to any who ask.

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S0419

Man to Man

By RALPH L. LEE

The Telephone, Inside and Out

"It wouldn't hurt to take inventory of what's going on around the place over the telephone—who's doing the company talking and how"

LOOKING BACK over my many foundry visits, I don't believe I can remember one case in which my guide was able to complete the trip with me without excusing himself twice for telephone calls. Nor from the same visits can I recall any fat-chewing office sessions which also weren't interrupted by the telephone bell itself or by news of its ringing heralded by secretary or clerk.

Of the hundreds of meetings I've attended, I almost could count on one hand those that managed to get through without someone tiptoeing down the center aisle with creaking shoes and all eyes following to whisper in the chairman's ear, "Mr. Doerfenheister is wanted on the phone."

And who hasn't wrestled through some involved and cantankerous problem to a point where light just has begun to break through when some longwinded telephone conversation on another subject doesn't scatter all the jigsaw puzzle pieces to the four winds?

Combination receptionists, typists and file clerks with just about all of the office work they can handle can hardly be expected to answer one phone call after another with the milk of human kindness seeping through these interruptions into the ears of the folks on the other end. All in all, it's little wonder that from a busy, inside point of view, answering a phone can be looked upon as an irritating interruption or in some cases as one big pain in the neck.

Quite some time back, while working on my Goldberg sand tester, I ran into the desperate need for some bi-metal (that metal which warps when heated or cooled). The name of a nationally known organization came to mind, for I had just finished reading some of its advertising which literally drooled with Boy Scout offers to be helpful to anybody and everybody interested in its field, which obviously included bi-metal. In fact, I *know* it did.

With quite a confusing array of departmental telephone numbers listed under this organization's name, the telephone directory wasn't very helpful; so I called the main number.

"Good afternoon, Stupenduous Incorporated."

"Could you direct me to someone who knows about your bi-metal?" I asked with all humility, realizing the infinitesimal size of the Lee Hobby Foundry in contrast to the enormity of Stupenduous Inc.

"Who are you calling?"

"I really don't know who to call, but you folks do make bi-metal, don't you?"

"Just a moment, please."

That moment seemed like five to ten minutes as I listened to the terrific traffic of calls being processed. Then came the voice, "Sorry, who are you calling?"

"As I said, I really don't know just who I should talk to. I'm trying to get some information regarding the bi-metal your company makes. Isn't there someone who could - -"

"Just a moment, please."

This moment seemed even longer than the first. Then the voice again.

"I'll connect you with Mr. Roamer."

Mr. Roamer's secretary answered by asking, "Who's calling please?" and seemed quite frustrated at not being able to remember me. Mr. Roamer was on another phone in the midst of a lengthy conversation. When he finally got to me, I could sense that his mind was still on his previous conversation and that who I was didn't ring his bell either.

In a polite but harried tone, and with just a touch of impatience with me for not already knowing, he explained that bi-metal was foreign to his particular division. He wasn't sure, but he thought that "If I wrote . . . Mr. (just a moment please)—Miss Plover—mumble, mumble—if you'll write Ropfter in our Zanesville, office he'll try to help you, I'm sure. Miss Plover, please give Mr. er-er, this gentleman, the address of our Zanesville office. Good by, Mr. er-er." Click!

I finally gave up my quest for bi-metal and riveted a piece of brass to a piece of steel, and the unit is still working, by heck!

The scene shifts now to another quest for information on some raw rubber materials for my diaphragm molder. My starting point and end point of my quest was with an equally illustrious organization. The telephone directory didn't help me one bit more than it had previously. But the first telephone contact started the ball rolling. The young lady answered the phone as though she liked her work and was ready for all callers, expecting the best.

She didn't know one bit more about the rubber material than the other girl knew about bi-metal. With no dilly-dallying she switched me to someone she thought might know. He didn't, but he knew who did, and in nothing flat I was through to a young man, just about to leave for lunch, who welcomed my inquiry as though good things might come of it, even though I explained how picayunish the Lee Hobby Foundry is.

This fellow took an interest in my problem. He didn't pretend to; he actually did, and he proved it by putting through an order for the materials he suggested—several, in fact, with the understanding that if they didn't do the trick, we'd find some that did. "When the samples arrive, Mr. Lee," he said, "be sure to give me a ring. I'd like to come out to your place and give you a hand with the materials."

By the way, I got the same patient and friendly treatment six or seven years ago when I visited the research headquarters of this splendid organization, although my friend on the phone did not know this and

Foundries and their customers agree...

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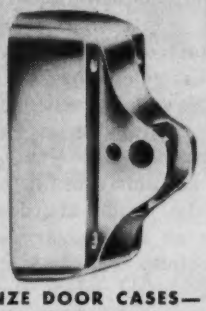

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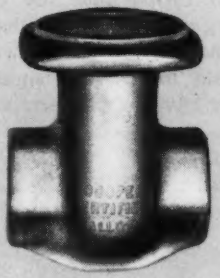
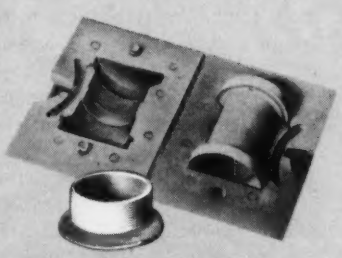
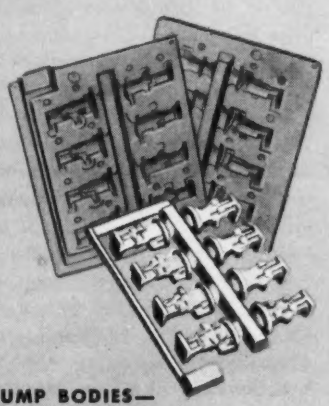


STAINLESS-STEEL VALVE BODIES—
"High productivity—superior finish"



NICKEL-BRONZE DRAIN HEADS—
"Costly thread-cutting eliminated"

YOKES—
"Production time cut 56% —finishing costs 50%"



PUMP BODIES—
"Machining reduced or entirely eliminated"

Why are so many foundries turning to shell molding? Why are so many of their customers specifying shell-cast parts? The answer is simple: *Shell molding cuts costs.* Smoother surface finish, greater dimensional accuracy, and greater yield per man-hour are among its advantages over conventional sand-casting methods. (Note the brief testimonials—from G-E files—that tell the story!)

Ask G.E. about shell molding

General Electric offers a number of foundry products to help you get maximum benefits from shell molding: *G-E phenolic shell-molding resins* to form light, dimensionally accurate molds . . . *G-E silicone parting agents* to secure quick, easy release of molds from patterns . . . *G-E phenolic bonding resin* to cement shell halves together.

FREE BOOKLET AVAILABLE...

How can shell molding help YOU? General Electric, a major supplier of resins and release agents for the shell-molding process, has prepared an informative 28-page booklet telling about the techniques and benefits of this new foundry method. For a free copy of *G-E Shell Molding Manual*, just write to General Electric Company, Section 1522-2A, Chemical Materials Department, Chemical and Metallurgical Division, Pittsfield, Massachusetts.

Progress Is Our Most Important Product

GENERAL ELECTRIC

CHIPPERS get longer, more comfortable protection

Rigid metal top bar holds sturdy nylon cups firmly—makes goggles much easier to handle, too!

Kover-Mor® Goggles designed for chippers are fitted with Willson *Super-Tough* lenses heat treated for greater impact resistance. Note how 4 screened eye cup ports admit air to keep lenses fog-free.

WILLSON

Kover-Mor® Goggles are roomy

...fit over large-frame prescription glasses

Kover-Mor® Chipper's Goggles are made of lightweight nylon with the highest *strength/weight ratio* known for goggle cups. Chippers say they have features that make them the most comfortable goggles of all.

Snug, easy fit is assured by adjustable two-piece headband, leather bridge curtain and metal top bar. Extra ventilation is provided by slots in screw caps *plus* ports in cups.

Standard 50 mm. round lenses fit Kover-Mor® Goggles. No need to stock odd-size replacement lenses! Lens changing is simplified by external screw caps.

Ask your Willson distributor for Kover-Mor® Chipper's Goggles—available with opaque or clear nylon cups. They'll withstand toughest use.

More Than 300 Safety Products Carry This Famous Trademark

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Leaders in Research and Development of Safety Products Since 1870

WILLSON PRODUCTS, INC., 237 WASHINGTON ST., READING, PA.

didn't know me from Adam. Isn't it amazing how an attitude like this spreads throughout an organization?

I don't think these two adventures over the telephone call for any moralizing, viewing with alarm, or loud voiced evangelism. There's always a reason for everything. However they do illustrate, it seems to me, how the inside attitude toward the phone as a necessary evil or as an opportunity can leak through with telling effect upon the prospective customer and public relations in general.

Heaven forbid that my choice of large organizations as illustrations of telephone good or ill will building should imply that small foundries need have no concern in this direction. Their need is greater, it seems to me. I could just as well have chosen any number of small outfits on my long list of friends who are masters of the telephoning art.

I don't think we'd be stretching it a bit to say that the good which can be done in this field rates the attention of the folks running the show. The National Cash Register Co. in Dayton, where I worked as a kid, would not permit anyone to represent it over the phone until he or she had been screened and instructed in telephone etiquette and technique. Some folks credit the firm with being pioneers in the field of salesmanship and public relations.

A good public relations job can hardly be done by a person who is already snowed under with important responsibilities with telephone answering thrown in as a straw that will break his back. Also, through no fault of their own, some people have voices which never were made for the telephone.

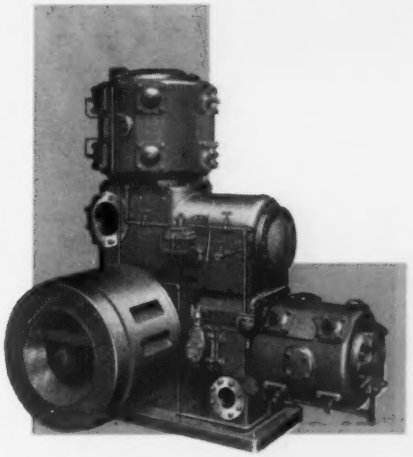
Others have personalities which can be appreciated only through time and long acquaintance. They are placed at considerable disadvantage over the phone. Then there are some with little or no background and no interest in the field who are responsible for incoming telephone calls.

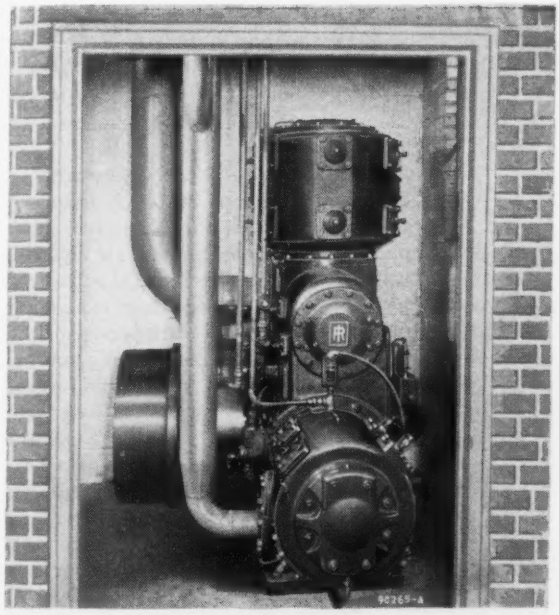
But probably the greatest barrier to cashing in on the use of the phone is its reputation as a work interrupter, together with a lack of appreciation of its outside importance.

It wouldn't hurt a bit to take sort of an inventory of what's going on around the old place over the phone—who is doing the company broadcasting and how. Maybe a slight shuffling, a little coaching and a lot of selling might be in order. The Lee Hobby Foundry is going to look into the matter pronto.

MORE AIR POWER in less floor space

That's one of the many advantages offered by this space-saving **XLE** *compressor:*





A bronze company squeezed this XLE into a small, unused storage room.

Packaged design for minimum floor space, and specially balanced for minimum foundation... ideal for skid-mounting.

Easy to operate... push button starting, grouped controls, automatic force-feed lubrication, automatic condensate removal, automatic air-operated starting unloaders and capacity control.

Easy to install or relocate... ready-to-run, assembled shipment ... simplified air and water piping.

Easy to maintain... simplified long-life construction... full-floating, cool-running, aluminum-alloy bearings that require no adjustment... no need to open the sealed crankcase which stays clean inside... streamlined exterior also easy to keep clean.

Low operating costs... new high-efficiency, long-life I-R Type A Channel Valves result in compressor efficiency comparable to the largest units... durable, high-efficiency tube-and-fin intercooler saves water... efficient direct-connected motor.

Built for reliable, continuous full-load service... sizes 125, 150, 200, 250, 300, 350 horsepower... discharge pressures 80 to 125-psi, two stage... write for more information today.

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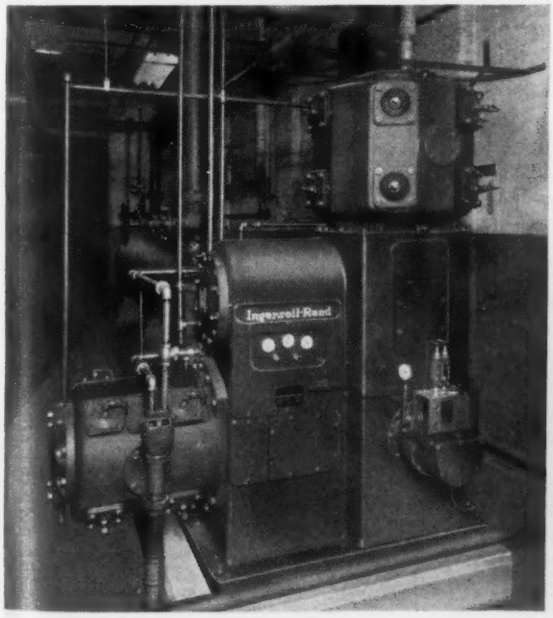
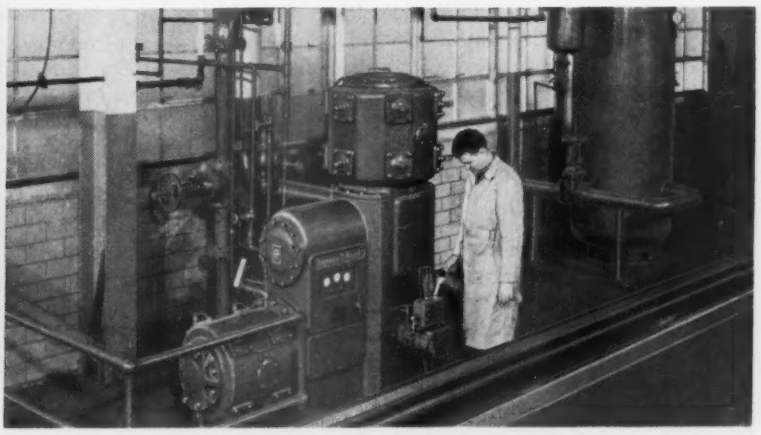
COMPRESSORS • AIR TOOLS • ROCK DRILLS
TURBO BLOWERS • CONDENSERS • CENTRIFUGAL PUMPS
DIESEL AND GAS ENGINES



A safety-razor manufacturer found plenty of space for this XLE installation in a screened-off basement corner.



And here's a compact, space-saving installation of an XLE compressor, aftercooler and air receiver in a tool plant

NFA LOOKS AT LABOR PROBLEMS: Members of the National Foundry Association administrative council met in Washington on Mar. 3, with members of the House and Senate labor committees. Luncheon scene above includes, left to right, C. T. Sheehan, Paul L. Arnold, Senator William Purtell (R., Conn.), W. W. C. Ball, Summerfield Brunk, L. P. Robinson, George A. Euskirchen, A. V. Martens, Erich Wussow, J. Boettcher, A. J. Fruchtl, Lewis Essex, R. R. Washburn, William J. Bulman, H. M. Greenbaum, A. L. Dyer and John Livingston. Several members of the House labor committee attended a dinner in the evening. Below, left to right, Mr. Arnold and Mr. Ball look on as Mr. Brunk is presented a plaque by Mr. Martens for his services as president of the NFA in 1953 and 1954

Dietert Plans Sand School In Detroit on Aug. 15-17

The Harry W. Dietert Co., Detroit, will hold a three-day Sand School, Aug. 15-17, at the Detroit Engineering Society, Woodward Ave., Detroit. There will be no charge for attendance.

The school, intended particularly for the supervisory and technical personnel of the foundry, will be patterned on the theme that foundry cost is greatly affected by foundry sands. Sand affects cost in two major ways:

1. The ease with which a core maker or a molder can work a sand can be materially altered by compounding an easy-to-work sand.

2. The casting quality can be improved and scrap loss can be reduced by proper selection and control of a sand.

Ways and means of incorporating these two items into practice in a foundry will be detailed by studying the sand from the fundamental viewpoint that a sand must possess six distinct properties to perform its task completely in the foundry. These six properties are: Structural properties, green properties, air-set properties, dry properties, hot properties, retained properties.

A detailed study will be made of each group of properties. In this way, a clear picture is obtained of the function of each property as it affects ease of working the sand in reference to manual effort and supervision required.

Illustrations will also be given on how to control the various properties of a sand. The effect of adding various additives will receive attention.

The proper selection of the better numerical values of each essential sand property will also be studied. Emphasis will be placed on the fact that when the essential properties are carefully controlled at selected values then one has a sand requiring the least attention and is the most foolproof.

Both motion pictures and lantern slides will be used to illustrate the lectures. The lectures will be given by Victor M. Rowell of the Harry W. Dietert Co.

Chemical Flocculant Cleans Foundry Wash Waters

A chemical flocculant developed by Monsanto Chemical Co., Springfield, Mass., to remove suspended solids from foundry wash waters is reported to be effective in concentrations of as little as two parts per million. It will clarify any contaminated water, including products of sand reclamation systems, dust collectors and normal plant runoff.

Lime is added to the water first to produce an initial state of incipient flocculation, and flocculation is completed by the addition of an aqueous solution containing as little as 0.5 per cent of the flocculant. Amount of flocculant required depends on the solids content of the water, but ordinarily should not run to over eight parts per million in the settling unit.

Floccules settle out as a sludge which filters rapidly and yields a low-moisture-content filter cake that is readily handled. Overflow waters are clear and may be used as a wash water in a sand reclamation system or be discharged safely in a sewer or waste stream with little danger of violating stream pollution regulations or other sewage laws.

Controllership Foundation Publishes Bibliography

Reflecting management's growing interest in long-range planning, the Controllership Foundation Inc., research arm of Controllers Institute of America, has issued an indexed and annotated bibliography, "Management Planning and Control," listing 721 separate books, monographs and magazine articles on the subject.

Information in the 178-page volume includes references on organization, establishing the goals of business, forecasting and related analyses, expenses and operations, and a comprehensive section on budgeting and control.

Copies are obtainable from the foundation at 1 East 42nd St., New York 17, at $5 to members of Controllers Institute, and $6.50 to others.

NOW...MORE WORK with HYDRATORK!

Clark Carloader sets new standards for the industry!

NEW! Increased engine power gives you faster acceleration, faster travel speeds, power reserve for extra work-loads.

NEW! Faster lifting speeds. Lifting speed when loaded has been increased to 37 feet per minute.

NEW! Improved Hydratork Drive has greater gear reduction to convert higher engine speeds for more power.

NEW! Top gradeability. The most efficient operating power-train on the market today, provides power when you need it to climb the steepest grades.

No clutch—no gears to shift gives you better maneuverability, less driver fatigue—MORE WORK! Power multiplication through torque converter gives you extra power, smooth acceleration —MORE WORK! No clutch means easier driving, less down-time—MORE WORK! Anyway you look at it . . . you'll get *more* work with Clark's Hydratork Carloader. Ask your local Clark dealer for details.

A BETTER BUY WITH LOCAL SUPPLY—*Genuine Clark Parts*

CLARK® EQUIPMENT

Industrial Truck Division
CLARK EQUIPMENT COMPANY
Battle Creek 16, Michigan

Rx for maintaining hot metal schedules

CRYSTOLON* refractories are engineered and prescribed for more continuous furnace operations, both front and back slagging

You can maintain hot metal schedules for your casting line and avoid costly shutdowns by using Norton CRYSTOLON refractories — *engineered and prescribed* for highest efficiency in handling neutral and acid cupola slags.

For back slagging cupolas the Rx is CRYSTOLON slag hole blocks. For capping the notch and lining the slag chute in front slagging cupolas it's CRYSTOLON bricks and cement.

Wherever you use it, this top-quality silicon carbide refractory material will stand up under temperatures as high as 3050°F without softening, spalling or cracking. Its extreme density assures exceptional resistance to slag penetration and attack — and it lasts 5 to 15 times longer than ordinary fire clay.

In your own foundry

these advantages mean less maintenance time and trouble for your men — and faster, more profitable metal-melting for *you*. CRYSTOLON bricks and blocks are made in sizes and shapes for every foundry requirement. See your Norton Representative for further facts. Or write to NORTON COMPANY, Refractories Division, 306 New Bond St., Worcester 6, Mass. *Canadian Representative:* A. P. Green Fire Brick Co., Ltd., Toronto, Ont.

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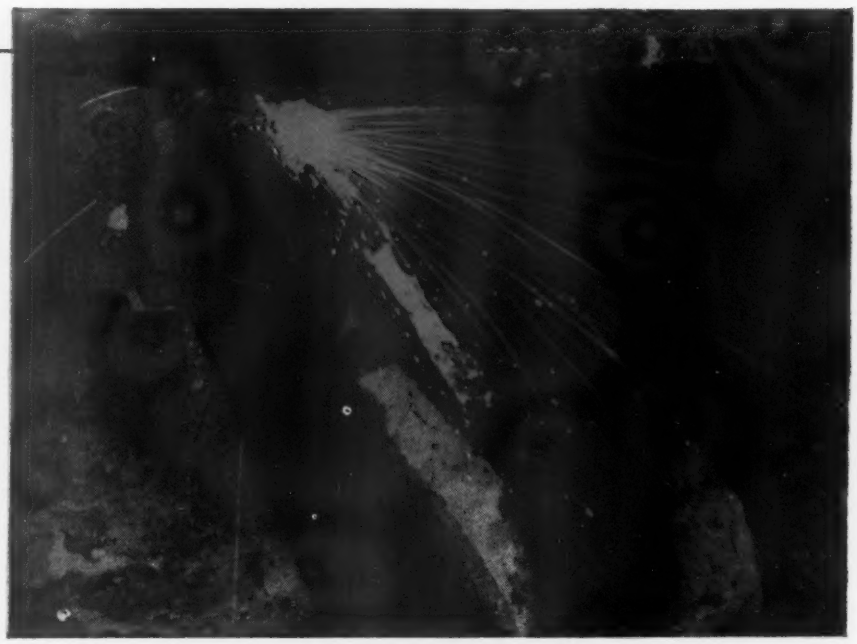
REFRACTORIES
Engineered... Rx... Prescribed

Making better products...
to make your products better

*Trade-Mark Reg. U.S. Pat. Off. and Foreign Countries



Up to 64 hours of operation without shutdown, under severest back slagging conditions, are reported by users of CRYSTOLON slag hole blocks — like this one, on heavy duty service in a big automotive parts foundry.

More efficient, lower cost metal-melting results when crucial points are guarded by CRYSTOLON refractories — slag hole blocks for back slagging cupolas, bricks and cement for front slagging cupolas.

INVESTMENT CASTING PRODUCERS

Hold Technical and Business Meeting in New York

By FRANK G. STEINEBACH
Editor

THE Investment Casting Institute, the youngest and one of the most enthusiastic of the associations serving the foundry industry, held a highly successful technical and business meeting at the Park Sheraton Hotel, New York, May 5-6. V. S. Lazzara, Casting Engineers Inc., Chicago, and vice president of the institute, presided in the absence of Ted Operhall, Misco Precision Casting Co., Whitehall, Mich., who was forced to return home because of illness.

In discussing the development of specifications applicable to investment cast metals, Charles Yaker, Misco Precision Casting Co., and chairman of the Metal Specification Committee, stated that the committee has completed recommendations for metal specifications for investment-cast low-alloy steel, plain carbon steel and cobalt-base alloy. Each will carry an ICI designation and will be circulated to the industry for approval. Future work of that committee will include the development of specifications for nickel-base, copper-base and magnesium-base alloys.

Dr. Nicholas J. Grant, Massachusetts Institute of Technology, Cambridge, Mass., reported on recommended melting practices for small heats. He pointed out that making small heats is difficult because reproducing specified chemistry from available sources of raw materials constantly presents the problem of deviation from one heat to another. Losses through oxidation, volatilization, contact with the crucible and lack of exact controls provide these problems. Dr. Grant said it is easy to overheat small heats, providing high solubility of undesirable elements. Furthermore, it is difficult to determine proper additions to compensate for losses. The speaker described in some detail the types of furnaces used by investment casting foundries, giving advantages and disadvantages of each.

Dr. Grant emphasized that melting must be accomplished as rapidly as possible, but the metal must not be overheated. Be sure the materials charged are free of oxide or scale. If the material does have scale, clean it by blasting before charging Charges must be dry. Deoxidizers are more effective at low temperatures. Dr. Grant suggested the use of immersion thermometers when possible.

Prof. C. M. Adams, MIT, presented a practical discussion of gating, sprueing and risering in investment casting. The riser should be located at the place where the last drop of metal is expected to freeze. Because many foundrymen provide a safety factor in determining the size of the riser, it frequently is too large. A riser is more effective when it is close to the casting. To illustrate this he described a situation where the riser was almost completely surrounded by the casting. Prof. Adams discussed pressures and fluid flow from the riser to various parts of the casting. He recommended that atmospheric pressures be used; therefore it is well to prevent a crust from forming over the riser. In conclusion, he suggested that the foundryman should not be too concerned with the complexities of information on gating and risering in the literature of the industry.

B. W. Duncan, Alloy Precision Casting Co., Cleveland, and chairman of the committee on Physical and Non-Destructive Testing, reported the committee has completed a questionnaire for circulation to producers of investment castings to determine experiences in the preparing and testing of test bars. As a first step in developing standard test bars for use by industry, the committee has completed specifications for a proposed standard test bar for super-alloys.

K. M. Bartlett, Thompson Products Inc., Cleveland, substituted for E. G. Chapman, Misco Precision Casting Co., in presenting the report of the Dimensional Tolerances Committee. Project for the present is the development of a design manual for investment castings. This will present an analysis of design factors which affect the tolerances one may expect from investment castings, as well as other factors. The committee will endeavor to have the manual in proposed form in time for the fall meeting.

Report of the Process Materials Standards Committee was presented by Walter Dubovick, Engineered Precision Casting Co., Matawan, N. J. The committee will undertake to determine the optimum properties and methods of manufacture of all materials, other than metal, used by the investment casting industry. This will be followed by the development of standard tests and specifications that will permit supplier and purchaser to control quality and guarantee conformance to optimum properties. The

Pangborn Presents Awards at Annual Banquet

PANGBORN CORP., Hagerstown, Md., recently held the fourth annual banquet of its Quarter Century Club at the Alexander Hotel, Hagerstown. Eighteen new members were welcomed to the club, and President Thomas W. Pangborn presented each with an engraved gold watch.

The eighteen who received watches include: Oscar H. Butts, Robert V. Delaney, Robert E. Donnelly, Adnah L. Gruber, Charles M. Hartman, George G. Hoffman, John R. Hyssong, Wallace F. Jones, John E. Keplinger, Alvey L. Kinsey, Walter S. Miller, George J. Reichert, Ralph D. Ridgley, Bruce T. Rinehart, Arthur C. Shearer Sr., Richard H. Smith, Ralph M. Trent and Leonard W. Unger.

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SPO also recognizes this basic need . . . the need for precision machines. That is why SPO specializes in the development and manufacture of dependable molding machines . . . efficient machines that produce a greater volume of uniform standard molds . . . eliminate "human error" . . . cost less to operate and maintain.

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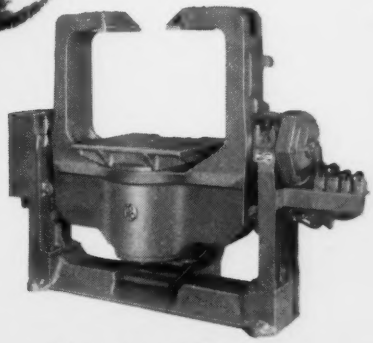

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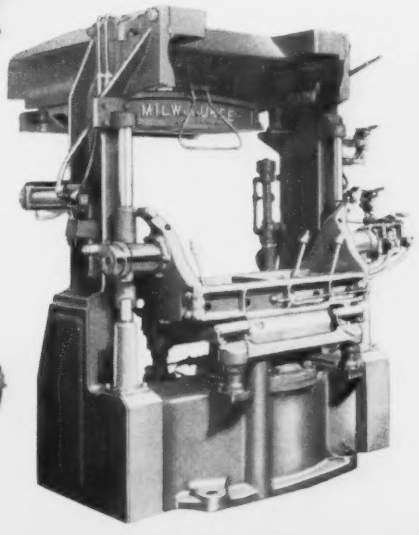

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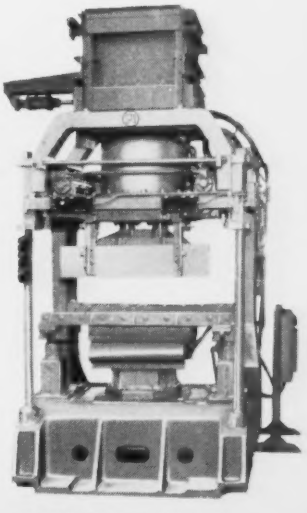

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. . . highest quality
. . . uniform performance

For maximum metal temperatures with minimum coke per charge—specify Indianapolis Foundry Coke.

Always high in carbon content, always low in sulphur . . . . low in ash . . . . uniform carbon absorption.

And because its structure is carefully controlled, Indianapolis Foundry Coke resists breakage.

Four sizes—top and bottom limits 1" —to fit your cupola operations. Specify Indianapolis Foundry Coke for top performance.

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Established 1890

committee will first compile and classify a list of materials and supplies and a record of test methods and specifications now in use. Existing standard tests and specifications will be selected and submitted to the members for adoption as ICI specs.

Dorian Shainin, Rath & Strong, Boston, discussed quality control and how it can be utilized in the production of investment castings. James H. Moore, Vacuum Metals Corp., Syracuse, N. Y., described recent developments in vacuum melting. Slides showed the effect of that type of melting on various base metals, and the effect on the dimensions, mechanical properties and surface finish of the castings.

Three subcommittees have been established to undertake studies on expendable pattern material, proprietary investments and investment raw materials.

L. E. Brooks, Jelrus Precision Casting Co., New York, and chairman of the Industry Surveys Committee, reported that a monthly sales survey would be sponsored by ICI. Companies will report monthly sales and will receive a report of all participating companies. The committee also is preparing an annual wage survey in the industry.

Harry P. Dolan, executive secretary, announced the board of directors had voted to accept the invitation of the National Castings Council to join that organization.

Mr. Dolan also reported that because of the interest displayed by government and commercial users in investment castings, the institute is studying the possibility of sponsoring a short course in investment casting design. Such a course would be open to engineers and designers who would benefit from a greater knowledge of applications of investment castings. A committee has been appointed to develop details on such a course, and to determine material to be covered and location.

Film Depicts Shell Molding

Shell molding operations are shown in a 15-minute sound and color film offered by Link-Belt Co. to describe a four-station machine and related conveying equipment for handling sand and resin. Illustrations of a four-station shell closing machine and conveying equipment for handling finished shells through pouring and shakeout are also shown. Examples of castings made by the method are demonstrated in the film. Film may be secured, without charge to interested groups, by writing Link-Belt Co., Dept. PR, 307 North Michigan Ave., Chicago 1.

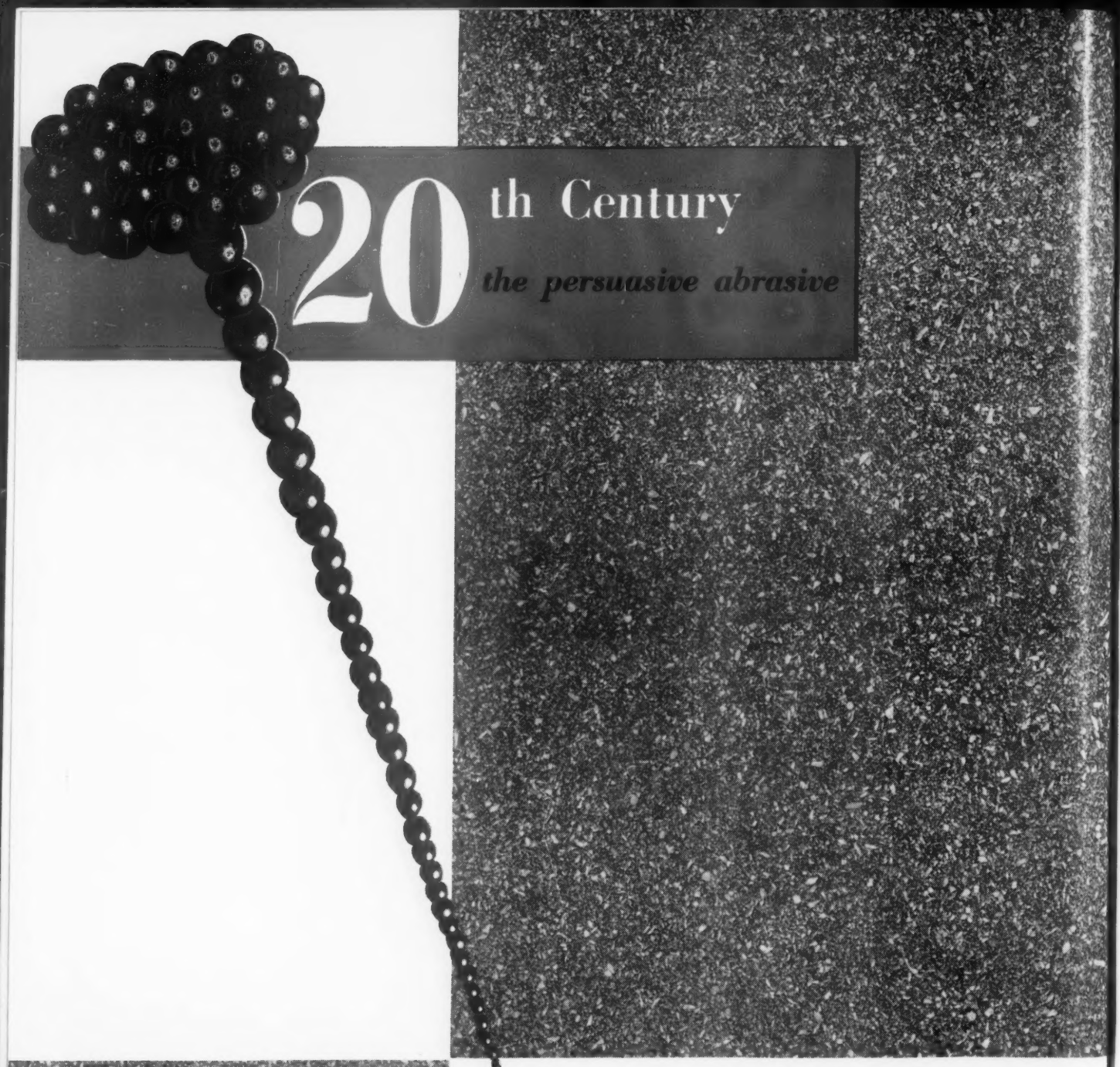
"More Combustion Information with Cities Service Heat Prover"

says Keystone Steel & Wire Co.

The Keystone Steel & Wire Company of Peoria, Illinois, is one of many companies now taking advantage of the portable Heat Prover . . . the remarkable combustion analysis instrument supplied and maintained free by Cities Service.

Says Keystone official, Glen Sharp: "For day to day use on the shop floor, the Heat Prover is, in my opinion, the most convenient and practical device available today. We use it throughout the plant for practically every kind of combustion analysis. It is particularly valuable where multiple fuels are used, in cases where both combustibles and free oxygen are present in the flue gas, and again, where normal combustion products are involved in the process itself. It gives simultaneous readings of oxygen and combustibles, and permits continuous explorations of the sampled area if desired. All these advantages make the Heat Prover ideal for Open Hearth work."

The Cities Service Heat Prover is not a product you buy, but a service we supply . . . free! For more information, contact your nearest Cities Service office or write Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.



20th Century

the persuasive abrasive

PINPOINT your thinking about metallic abrasives:

1. Look for a *tough*, long-wearing abrasive.
2. Keep a close eye on its *uniformity*.
3. Insist on *quality*.

You'll find our 20th Century *Normalized, the persuasive abrasive, will meet all these requirements *and* give you greater production efficiency and economy.

Write for our new catalog No. 1153.

THE CLEVELAND Metal Abrasive **CO.**

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*One of the world's largest producers of quality shot, grit and powder — Hard Iron — Malleable (*Normalized) — Cut Wire — Cast Steel (Realsteel)*

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Foundry Statistics

MALLEABLE IRON

(Shipments of castings—net tons[1])

	Shipments		Unfilled Orders[2]
	Total	For Sale	
1953	970,506	578,749	.....
1954			
Mar.	84,342	47,125	74,219
3 mo.	223,708	123,183	.....
Apr.	74,515	39,102	69,094
May	67,856	37,306	67,040
June	72,820	41,121	60,163
July	50,893	25,243	63,711
Aug.	59,259	34,528	62,494
Sept.	58,015	33,929	66,742
Oct.	64,321	36,956	71,090
Nov.	70,030	41,609	80,686
Dec.	80,599	49,005	85,064
Total	812,016	461,982	.....
1955			
Jan.	82,028	48,000	99,817
Feb.	85,979	48,721	101,766
Mar.	102,364	60,063	99,730
3 mo.	270,371	156,784	.....

ALUMINUM

(Shipments of castings—1000 pounds)

	Shipments				Unfilled Orders[2]
	Total	Sand	Perm. Mold	Die	
1953	658,022	214,553	200,025	239,330	.....
1954					
Mar.	56,184	14,468	19,576	21,645	93,407
3 mo.	158,843	43,862	53,472	60,108	.....
Apr.	53,006	14,073	18,091	20,366	91,853
May	47,663	12,461	16,312	18,368	83,848
June	48,061	12,442	17,105	17,886	79,126
July	39,636	11,299	13,749	14,004	76,513
Aug.	42,429	11,252	15,335	15,213	76,684
Sept.	46,249	10,717	16,641	18,228	79,873
Oct.	53,901	12,765	19,238	21,245	88,518
Nov.	55,224	12,934	20,396	21,296	94,491
Dec.	64,045	13,753	23,629	26,017	99,556
Total	609,057	155,558	213,968	232,731	.....
1955					
Jan.	64,414	13,358	23,679	26,819	102,382
Feb.	66,869	13,579	24,319	28,234	108,939
Mar.	78,958	16,019	29,029	33,229	110,046
3 mo.	210,241	42,956	77,027	88,282	.....

COPPER-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments			Unfilled Orders[2]
	Total	Sand	Perm. Mold	
1953	990,496	888,369	61,316	.....
1954				
Mar.	76,480	67,952	5,123	38,417
3 mo.	216,766	191,899	14,484	.....
Apr.	72,900	65,418	4,732	34,111
May	67,859	61,469	3,755	31,568
June	70,777	64,328	3,567	30,743
July	56,380	51,070	3,073	30,872
Aug.	68,891	63,389	3,547	28,883
Sept.	68,267	62,152	3,637	31,087
Oct.	70,276	63,855	3,619	30,296
Nov.	70,020	63,065	4,089	27,508
Dec.	72,421	65,159	4,346	31,954
Total	834,557	751,804	48,849	.....
1955				
Jan.	72,233	64,540	4,678	30,864
Feb.	75,253	67,768	4,598	37,520
Mar.	92,149	83,149	5,649	42,940
3 mo.	239,635	215,457	14,925	.....

MAGNESIUM

(Shipments of castings—1000 pounds[1])

	Shipments		Unfilled Orders[2]
	Total	For Sale	
1953	34,517	31,469	.....
1954			
3 mo.	7,052	6,203	.....
Mar.	2,407	2,109	7,698
Apr.	2,068	1,857	7,358
May	1,738	1,541	7,522
June	2,034	1,820	8,296
July	1,924	1,712	8,073
Aug.	2,157	1,944	7,795
Sept.	2,059	1,855	7,474
Oct.	2,092	1,876	7,294
Nov.	2,161	1,906	6,867
Dec.	2,287	2,031	6,678
Total	25,572	22,745	.....
1955			
Jan.	2,305	2,067	7,236
Feb.	2,160	2,009	7,376
Mar.	2,572	2,311	7,011
3 mo.	7,037	6,387	.....

PRODUCTION WORKERS

Estimated Number

(Thousands)

	Mar. 1955	Feb. 1955	Mar. 1954
Ferrous	201,400	193,800	195,000
Nonferrous	70,800	68,000	63,300

Average Weekly Earnings

Gray Iron	81.32	81.12	71.42
Malleable Iron	83.16	82.76	74.68
Steel	84.67	83.44	76.43
Nonferrous	85.90	84.45	79.00

Average Weekly Hours

Gray Iron	41.7	41.6	38.4
Malleable Iron	42.0	41.8	39.1
Steel	41.1	40.7	38.6
Nonferrous	41.1	40.6	39.5

Labor Turnover Rate (March)

(Per 100 employees)

	Total Accession	Total Separation	Quit	Layoff
Gray Iron	5.5	3.4	2.2	0.4
Malleable Iron	6.5	3.2	2.2	0.1
Steel	5.3	2.4	0.9	0.9
Nonferrous	5.3	2.6	1.6	0.5

Source: Bureau of Labor Statistics

GRAY IRON CASTINGS—SHIPMENTS (Net Tons[1])

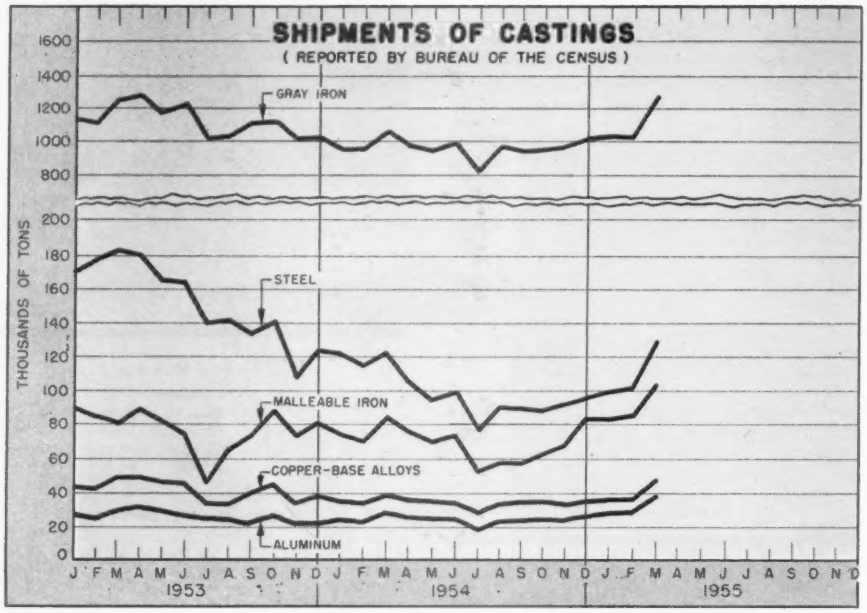
	All Castings		Miscellaneous Castings		Heavy Steel Ingot Molds		Chilled Railroad Car Wheels	Pressure Pipe & Fittings	Soil Pipe & Fittings	Unfilled Orders[2]
	Total	For Sale	Total	For Sale	Total	For Sale	Total	Total[3]	Total[3]	
1953	13,707,902	7,494,843	8,449,837	3,675,454	2,829,159	1,389,483	467,142	1,285,598	677,166	.....
1954										
Mar.	1,046,779	553,358	684,272	282,328	153,366	65,950	34,240	113,016	61,895	812,499
3 mo.	2,915,441	1,533,838	1,899,112	796,083	464,658	197,158	94,796	296,460	160,425	.....
Apr.	995,052	528,027	657,126	263,147	126,083	56,144	29,075	116,420	66,348	826,491
May	943,335	516,475	605,385	247,623	122,839	57,106	27,144	122,514	65,453	775,278
June	986,810	556,047	616,317	261,133	141,712	70,060	30,883	130,503	67,395	803,570
July	821,151	449,621	510,173	209,294	131,180	62,681	22,902	98,810	59,086	828,924
Aug.	934,644	541,904	569,790	250,702	140,165	69,897	29,134	127,255	68,300	829,505
Sept.	921,232	533,909	559,934	248,124	139,679	68,053	25,374	124,821	71,424	810,654
Oct.	942,934	552,022	570,365	253,802	150,282	79,191	23,599	130,326	68,362	789,117
Nov.	997,301	547,447	623,390	258,933	167,983	85,703	25,723	118,480	61,725	759,613
Dec.	1,074,258	563,699	680,700	276,045	200,044	97,936	27,229	111,082	55,203	744,633
Total	11,532,158	6,322,989	7,292,292	3,064,886	1,784,625	843,899	325,859	1,376,671	743,721	.....
1955										
Jan.	1,091,923	563,153	712,097	282,386	192,132	97,007	25,783	100,638	61,273	782,656
Feb.	1,106,165	578,171	720,304	291,675	196,118	99,794	27,401	95,285	67,057	852,168
Mar.	1,314,918	688,733	847,874	334,287	217,571	109,681	36,732	129,746	82,995	934,224
3 mo.	3,513,006	1,830,057	2,280,275	908,348	605,821	306,482	89,916	325,669	211,325	.....

STEEL CASTINGS—SHIPMENTS (Net Tons[1])

	All Castings			Carbon			Alloy			Unfilled Orders[2]
	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	
1953	1,834,197	1,400,013	321,010	1,276,729	959,493	293,491	557,468	417,148	27,519	.....
1954										
Mar.	122,310	92,271	15,684	85,211	63,137	14,190	37,099	29,316	1,494	214,367
3 mo.	361,588	274,547	53,819	250,571	187,663	49,386	111,017	88,205	5,251	.....
Apr.	105,788	78,754	11,031	72,118	52,652	9,538	33,670	26,365	1,493	197,857
May	94,610	70,596	9,454	64,546	46,768	8,342	30,064	22,945	1,112	182,502
June	100,022	72,881	8,639	69,021	48,370	7,552	31,001	24,554	1,087	169,594
July	75,848	53,207	5,815	50,453	33,461	4,964	25,395	19,746	851	170,567
Aug.	89,590	66,792	9,844	61,344	44,236	8,148	28,256	22,556	1,196	168,303
Sept.	88,359	64,722	8,668	59,039	41,735	7,690	29,320	22,987	978	158,823
Oct.	87,085	64,004	8,580	56,705	39,872	7,596	30,380	24,132	984	154,079
Nov.	87,659	64,812	7,742	56,057	40,085	6,624	31,602	24,727	1,118	175,715
Dec.	93,547	69,843	12,489	62,967	45,632	10,469	30,841	24,211	1,020	179,148
Total	1,184,096	880,158	135,581	802,821	580,474	120,309	381,285	303,428	15,090	.....
1955										
Jan.	98,238	75,044	13,809	67,397	49,816	12,762	30,841	25,228	1,047	201,839
Feb.	106,430	80,729	16,501	74,709	55,014	15,381	38,945	25,715	1,120	202,301
Mar.	127,460	98,926	19,339	88,867	68,013	17,887	34,933	30,913	1,452	215,059
3 mo.	332,128	254,699	49,649	230,973	172,843	46,030	104,719	81,856	3,619	.....

[1]Source: Bureau of Census. [2]For sale only. [3]All cast iron pipe is shipped for sale.

FOUNDRY STATISTICS



COMMERCIAL HEAT TREATING

(National Billings of Metal Institute Members)

	1953		1954		1955	
	No. Reporting	Total Reported	No. Reporting	Total Reported	No. Reporting	Total Reported
Jan.	57	$2,897,265	57	$2,219,437	63	$2,100,000
Feb.	55	2,630,485	58	2,272,074	63	2,106,800
Mar.	52	2,924,713	59	2,345,010	63	2,500,000
Apr.	55	2,904,736	60	2,179,445	62	2,452,500
4 mo.		11,357,199		9,015,966		9,159,300
Annual total		31,733,067		24,244,368		.....

COKE PRODUCTION AND CONSUMPTION

(Net tons)

	Production	Consumption Total	Consumption By Foundries
1953	78,467,806	78,227,414	2,915,420
1954			
Mar.	5,146,189	5,177,765	228,139
3 mo.	15,848,332	15,737,533	663,551
Apr.	4,693,036	4,569,843	212,272
May	4,802,245	4,656,950	204,958
June	4,640,064	4,683,726	194,664
July	4,618,665	4,555,701	170,617
Aug.	4,510,603	4,501,477	195,344
Sept.	4,490,603	4,434,650	191,607
Oct.	5,082,374	5,100,135	208,418
Nov.	5,230,237	5,283,916	221,391
Dec.	5,610,564	5,615,228	217,104
Total	59,526,723	59,139,159	2,479,926
1955			
Jan.	5,805,926	5,862,113	234,784
Feb.	5,394,166	5,519,241	242,282
Mar.	6,235,824	6,313,312	286,186
3 mo.	17,435,916	17,694,666	763,252

INGOT BRASS AND BRONZE

(Shipments in net tons)

	1954	1955
Jan.	20,661	25,201
Feb.	19,920	25,349
Mar.	23,653	29,713
Apr.	24,746	27,641
May	22,269	.....
June	22,348	.....
July	17,074	.....
Aug.	21,684	.....
Sept.	22,464	.....
Oct.	24,080	.....
Nov.	23,061	.....
Dec.	21,273	.....
Total for year	263,233	.....

ZINC-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments Total	Shipments For Sale	Unfilled Orders[2]
1953	521,253	349,022	.....
1954			
Mar.	42,991	28,828	52,544
3 mo.	139,237	88,412	.....
Apr.	38,968	25,211	51,388
May	36,793	23,671	46,726
June	40,708	26,890	47,537
July	28,306	18,605	43,231
Aug.	34,639	24,898	46,288
Sept.	36,594	25,617	56,006
Oct.	39,072	27,337	64,500
Nov.	48,437	35,207	62,750
Dec.	54,410	35,211	69,403
Total	434,785	295,587	.....
1955			
Jan.	58,586	35,472	70,691
Feb.	58,585	35,893	73,858
Mar.	71,811	44,048	81,363
3 mo.	188,982	115,413	.....

INDEX OF FOUNDRY EQUIPMENT ORDERS

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1954	1955
Jan.	173.8	81.0
Feb.	99.9	90.4
Mar.	82.7	163.6
Apr.	125.3	178.6
May	80.8	....
June	86.4	....
July	68.8	....
Aug.	75.6	....
Sept.	68.3	....
Oct.	147.5	....
Nov.	61.4	....
Dec.	113.9	....

Note: Figures are percentages of the base period 1947-49 taken as 100 per cent (monthly average). This is a new base period. Source: Foundry Equipment Manufacturers Association.

IRON AND STEEL SCRAP CONSUMPTION

(Gross tons*)

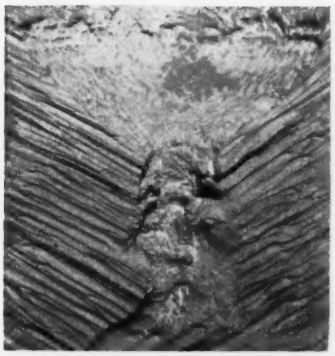
	All Scrap Total	By Types of Furnace: Cupola Total	Air Total	Electric Total
1953	69,005,976	9,676,463	1,026,334	8,263,880
1954				
Feb.	4,385,340	704,535	67,263	462,095
2 mo.	8,959,724	1,415,870	138,465	967,631
Mar.	4,637,573	783,529	82,337	517,702
Apr.	4,582,862	748,766	79,183	518,048
May	4,776,603	710,159	67,368	506,582
June	4,664,561	725,910	75,306	515,019
July	3,909,336	565,275	45,920	420,564
Aug.	4,164,703	671,631	65,336	486,596
Sept.	4,298,495	675,593	68,860	500,349
Oct.	4,782,488	710,127	67,678	528,432
Nov.	4,928,850	737,286	71,844	573,298
Dec.	5,075,563	798,435	92,910	566,223
Total	54,780,758	8,542,581	855,207	6,100,444
1955				
Jan.	5,416,052	813,682	90,622	614,824
Feb.	5,350,452	823,465	91,916	577,296
2 mo.	10,766,504	1,637,147	182,538	1,192,120

PIG IRON PRODUCTION AND CONSUMPTION

	Production** (standard grades—net tons) Total	Foundry	Malleable	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Consumption* (By type of furnace—gross tons) Total	Cupola	Air	Electric
1953	74,879,511	2,599,307	3,736,431	60,465,016	8,347,825	66,637,364	4,918,480	272,311	164,267
1954									
Apr.	4,449,289	155,249	256,662	3,630,901	406,477	4,021,957	375,045	26,553	10,497
4 mo.	19,652,186	709,305	1,067,416	16,030,578	1,844,887	17,616,995	1,480,374	82,799	48,079
May	4,572,252	154,768	231,479	3,741,671	444,334	4,188,269	367,437	16,453	16,531
June	4,683,629	175,759	200,154	3,853,444	454,272	4,297,531	375,601	18,545	14,196
July	4,590,076	182,130	182,527	3,790,999	434,420	3,990,431	293,926	12,258	13,317
Aug.	4,529,291	186,097	165,891	3,722,094	455,209	4,013,552	354,067	15,926	10,325
Sept.	4,417,888	188,599	179,629	3,622,799	426,861	4,005,578	346,698	16,984	11,654
Oct.	4,937,436	212,237	248,643	3,979,437	497,119	4,518,770	367,063	16,186	11,307
Nov.	5,204,446	202,824	263,484	4,233,253	504,885	4,764,215	375,526	16,178	15,932
Dec.	5,526,720	229,717	259,423	4,510,772	526,808	4,978,200	403,726	19,829	13,917
Total	58,113,924	2,241,436	2,798,646	47,485,047	5,587,465	52,373,541	4,364,418	215,158	155,258
1955									
Jan.	5,729,404	243,608	272,451	4,703,875	509,470	5,202,360	409,281	18,874	20,016
Feb.	5,394,585	209,852	252,860	4,425,080	506,793	4,964,515	409,141	20,576	22,551
Mar.	6,406,902	221,437	359,413	5,239,116	586,936	.....	.....	.....	.....
Apr.	6,329,927	210,085	305,188	5,068,506	746,148	.....	.....	.....	.....
4 mo.	23,860,818	884,982	1,189,912	19,436,577	2,349,347	.....	.....	.....	.....

*Source: U. S. Dept. of Interior, Bureau of Mines. **Source: American Iron & Steel Institute. [1]Source: Bureau of the Census. [2]For sale only.

USITE



Typical Depression Cast Steel Riser

Typical Depression Steel Ingot

is an efficient insulator for maintaining the temperature of metal in hot tops, risers and transfer ladles.

When used "pound for pound" in comparison with other hot top insulators, it will give

GREATER YIELD WITHOUT CONTAMINATION at LESS COST.

HERE ARE THE REASONS WHY:

- **USITE** is a fine powder, and therefore spreads readily.
- **USITE** is free of graphite and other forms of carbon soluble in molten steel.
- **USITE** is chemically inert, and will not contaminate the melt.
- **USITE** does not affect the carbon content of the steel.
- **USITE** promotes the formation of flat shrinkage in the head.
- **USITE** keeps the metal fluid in the hot top or riser.
- **USITE** prevents the formation of secondary pipe.

Manufactured in the U.S. from domestic materials, USITE is shipped in non-returnable barrels containing approximately 500 lbs. Other USITE products are: USITE HOT TOP BLANKET, guaranteed free from graphite; USITE TYPE F-1, (EXOTHERMIC), for steel ingots, cast steel risers and gray iron risers. A test in your own plant will convince you of the superior qualities and economies of USITE. Our technical staff will be glad to answer any chemical or metallurgical questions involving our products.

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ANNEEL-PAK

Guaranteed free of graphite, it flows like red hot rain at 2100°. Has a very fast rate of convection.

- **NO** trapped air
- **NO** voids or fuseing
- **NO** gas, fumes or flame
- **NO** recarburization
- **NO** decarburization
- **NO** adherence to parts
- **NO** solidifying
- **NO** gumminess, shrinkage

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USE BARCO PRODUCTS

MANUFACTURERS OF Metallic Manganese Sulphide; Barium, Strontium, Manganese and Calcium Products; Carbonate-oxide-hydrate-hydroxide-peroxide-chloride-chromate-sulphide-sulphate-oxalate-thiusulphate-fluoride-acetate-nitrate-hydrogen peroxide-anti-scumming dust-Barium "XA" and special formulas compounded to order.

Territorial distributors wanted in United States and Canada.

MEX-R-CO Unburned Graphite-Base
HELSPOT BRICK

NEW Graphite-Base Brick!

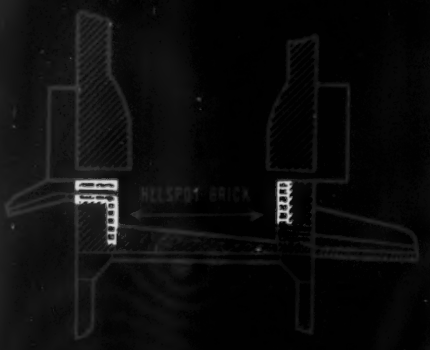
HELSPOT Brick—as Mex-R-Co's latest contribution to the metal-melting industry — are outstanding graphite-base brick. They are manufactured by a **new process,** of **pre-manufactured base materials,** and are very uniform in structure and size. Other superior qualities of HELSPOT Brick include low porosity and negligible shrinkage.

Impressive records of service are already being established in a number of installations for which HELSPOT Brick were designed:

CUPOLA WELL—HELSPOT Brick gave 31 days' service—with minor maintenance—in a cupola producing 350 to 450 tons per 16-hour day.

RUNNERS and SPOUTS—HELSPOT Brick gave 4 to 5 times greater service than ordinary firebrick—which meant 25% materials' saving, PLUS saving in labor.

LADLES—HELSPOT Brick practically eliminates bridging; skulls easily released; cleaning time reduced; fewer repairs required.



Foundries and Steel makers now have available—in the NEW HELSPOT Graphite-base Brick—a product that assures improved performance in a wide range of metal-melting operations.

Unburned HELSPOT Brick are furnished in Standard 9-inch Series Shapes and 9x6x4 Cupola Block sizes, palletized for shipment, ready for installation.

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AFS TECHNICAL DISCUSSIONS

At Houston Attract Large And Interested Audiences

INTENSE interest of foundrymen in new developments in casting practices was evidenced by the large attendance at the AFS Sand Division dinner meeting held during the Houston convention. It was one of nine technical sessions, in addition to a shop course, conducted by the division.

The carbon dioxide process for hardening cores and molds was the discussion topic which attracted some 260 to the dinner. A later influx brought attendance up to nearly 400 for the subsequent meeting. Elmer C. Zirzow, Werner G. Smith Inc., Cleveland, presided over the gathering, with Roy Carver, Carver Foundry Products Co., Muscatine, Iowa, co-chairman.

Speaker was Dr. Waldemar Schumacher, Concordiahutte A. G., Bendorf-am-Rhein, Germany. At the conclusion of his talk he showed a motion picture depicting various foundry operations pertaining to the CO_2 process.

Dr. Schumacher pointed out that the process for production of molds and cores is comparatively simple. Cold, dry sand is mixed with a proprietary bonding agent which contains sodium silicate. The mixed sand is handled like green sand; it is rammed against a pattern in the flask or in a corebox, or it may be blown in. While still in the flask or corebox the sand is subjected to the action of carbon dioxide gas. This causes a prompt hardening of the sand. The mold or core can be used immediately without baking.

Various sand additives such as seacoal, pitch and wood flour may be used, and the molds may be coated with washes where necessary. Water-base washes must be torch dried or baked to drive off excess moisture.

A newer development in the process, according to Dr. Schumacher, is the addition of about 4 per cent clay to the sand mix. This is done in instances where difficulty would be encountered in separating a hardened mold from the pattern, or a core from the box, because of the condition of the equipment or intricacy of form. The clay addition provides sufficient green strength to the sand that the mold or core may be removed as in ordinary green sand practice and then treated with the carbon dioxide gas.

Several hundred people attended the Sand Division dinner and meeting to hear a discussion of the carbon dioxide process for sand hardening

In the subsequent discussion period it was pointed out that the amount of bonding agent used averages about 4 per cent by weight but would depend upon clay content and fineness of the sand. If difficulty is encountered in removing the sand from interior areas of gray iron castings, use of about 2 per cent seacoal in the mix helps considerably in providing collapsibility. At present all new sand is used for the mixture. Old or used sand is sent to the regular green sand molding department, where it is incorporated in sands used there without any troubles.

EDUCATION

EDUCATIONAL activities that can be carried on by AFS chapters were discussed at a meeting sponsored by the Education Division. R. Verne Righter, Central Foundry Division, General Motors Corp., Danville, Ill., presided over a panel of four speakers whose general topic was **Workshop for Local Chapter Education Committee Chairmen.**

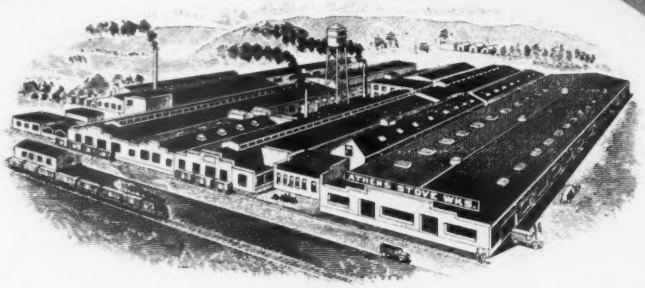
A. C. Hensel, Albion Malleable Iron Co., Albion, Mich., described chapter-sponsored courses on the subjects of sand, cupola practice, basic metallurgy and statistical control. These courses, conducted in February and March, included lectures and discussion. One of their important benefits is to give individuals an awareness of the operating problems in departments other than their own.

Speaking on the matter of developing prospective employees for the foundry industry, Mr. Hensel pointed out that the public has to be sold on the desirability of installing foundry courses in schools. At the same time, relatively little equipment is required to outfit a high school foundry, although the obtaining of instructors frequently is a problem. And even if only a few boys subsequently enter the industry, there is value in giving the students an understanding of the metal casting process.

Saginaw Valley Chapter has en-

SAN-BLO

F. O. MAHERY
VICE PRES.-GEN MGR



THE ATHENS STOVE WORKS, INC.

MANUFACTURERS OF STOVES

ATHENS, TENNESSEE

May 24, 1955

Mr. George E. Miller, Sales Mgr.
San-Blo Division
Federal Foundry Supply Co.
Cleveland 5, Ohio

ALL CONTRACTS CONTINGENT UPON STRIKES, ACCIDENTS AND CAUSES BEYOND OUR CONTROL. PRICES SUBJECT TO CHANGE WITHOUT NOTICE.

Dear Mr. Miller:

We thought you would be interested in learning how our San-Blo core blower is working out for us.

As you know, burner cores have always been a big problem for the stove industry, because of their thin sections, intricate contours and the required high strength. Consequently, it has always been difficult to adapt burner cores to a core blowing machine.

We previously tried other makes of core blowers, but without much success. We found that when we used sand heavy enough to make cores of sufficient strength, it would not blow consistently through the machine. If we used sand that would flow through the machine, the baked cores were too weak and would collapse.

We are pleased to advise that, with our model 40-D-1 San-Blo, we are now able to successfully blow all our burner cores, using a sand of sufficient strength to give us excellent cores and high quality castings. We might add that, on occasions, we have been able to eliminate the use of reinforcing wires, because of the uniform ram we obtain on the San-Blo.

Yours very respectfully,

THE ATHENS STOVE WORKS, INC.

F. O. Mahery Jr.

Sec. & Treas.

does the job again!

ATHENS STOVE WORKS *reports...*

"..with our model 40-D-1 San-Blo, we are now able to successfully blow all our burner cores...."

SAN-BLO succeeds where other core blowers fail because it uses an entirely new and different core blowing principle. The *exclusive* SAN-BLO sand chamber design utilizes motor-driven plows and "cyclo-air" action to *flow and ram* the sand, instead of *squirting* it into the core box. This enables the SAN-BLO to blow all practical core or molding sand mixtures with equal efficiency.

This ability to do the job—to blow any core sand mixture—is what particularly distinguishes the SAN-BLO from all other core blowers. The SAN-BLO can do the job for you, too! Call in your SAN-BLO sales-engineer, or write us for information.

In addition to "cyclo-air" action, the SAN-BLO provides the following important, exclusive features as *standard equipment* on its various models:

- **UNIVERSAL SAND CHAMBER**—Cores weighing from a few ounces to full capacity of machine are blown with the same sand chamber, at maximum blowing efficiency.
- **ADJUSTABLE SAND CHAMBER**—Sand chamber is easily raised or lowered to accommodate various height core boxes—eliminating "stooling" or expensive machine modifications.
- **QUICK-CHANGE BLOW PLATE**—For closed core boxes, the blow plate may be changed by simply removing the clevis pin and clamp ring—no tools required!
- **SINGLE PUSH BUTTON CONTROL**—All SAN-BLO models have single push button control for automatic clamping, blowing and drawing operations.
- **AUTOMATIC DRAW**—Self-adjusting, oil-controlled, with automatic change from slow to fast, for maximum speed and accuracy.

SAN-BLO *"cyclo-air" sand chamber, with motor-driven plows.*

Vent rods being inserted in Athens burner core box. Their SAN-BLO (right) is equipped with a clamping table "delay" unit, to permit withdrawing the rods before drawing the core.

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gaged in a variety of educational work, it was reported by Ormond Requadt, Foundry Division, Dow Chemical Co., Bay City, Mich. In summarizing the chapter's experience, Mr. Requadt said that the first requisite of an educational program is a good working committee. Second, a plan should be worked out that will suit the particular community in which it is to be used. It should be fairly simple at the start and then broadened as experience is gained and indicates what course to take.

Educator contacts are most important, because it is practically impossible to contact the students without educator co-operation. Through them opportunities are provided to work with such school-planned activities as "career carnivals" and industrial arts teachers conventions. Mr. Requadt concluded that while it is difficult to measure satisfactorily the results immediately of educational programs, the little seeds sown often enough and over the entire country by all the chapters will have a decided effect on the prosperity of the industry.

R. A. Oster, Beloit Vocational and Adult School, Beloit, Wis., described the operation of this type school, which has been established in all cities of the state having a population of more than 5000. At Beloit classes number about 240; total enrollment of approximately 4000 includes 1500 studying trades. Some courses are conducted for individual plants, with examinations given at their conclusion.

Frank C. Cech, Cleveland Trade School, Cleveland, outlined some of the educational work of the Northeastern Ohio Chapter. The chapter has been particularly active in steps which have led to the building of a new and larger trade school in Cleveland. It will incorporate improved foundry and pattern shop facilities. The chapter's education committee has kept close contact with local schools, and has presented talks illustrated with a slide film before student groups to arouse interest in foundry careers. The committee also handles details of the annual apprenticeship contest conducted by the AFS.

At a roundtable luncheon concluding the Education Division program, Donald F. Lane, National Foreman's Institute, New York, discussed some of the aspects of in-plant training. He recommended that foremen's duties and responsibilities be clearly defined, as well as their degree of accountability for methods and procedures. He also suggested that each man's assets be inventoried before a formal training program is started.

REFRACTORIES

COST reduction methods featured two of the five papers presented at sessions sponsored by the Refractories Committee.

Improving Refractory Cost in Malleable Melting, by L. E. Emery, Marion Malleable Iron Works Division, Chicago Railway Equipment Co., Marion, Ind., discussed refractory practice with the cupola and ladles as well as the air furnace. The speaker said that life of the plant's air furnace bottom lining was about nine heats, or 150 firing hours, when 9 x 4 x 2½ brick was used. Failure resulted from metal penetration at the joints. By reducing the number of joints through use of larger brick, lining life was extended to as much as 20 heats or 350 firing hours. The new service bottom employs 12 x 6 x 3 brick at the front and 9 x 6¾ x 3 at the back.

Bung lining is tightened daily, and bungs are handled carefully when removed. By rotating position of the bungs it has been found that wear on the front and rear sections is equalized and repair time is reduced.

Mr. Emery described use of a ladle lining which increased the life 50 per cent and reduced cost 42 per cent. The lining mixture consists of 22 per cent fine graphite, 45 per cent ganister, 20 per cent fireclay, 10 per cent silica sand and 3 per cent western bentonite, plus 6 to 7 per cent moisture containing 2 per cent glutrin. Worn areas of the cupola well are repaired with a dry, carbon-bearing plastic material applied by a refractory gun. To date life has been 19 months without relining.

In subsequent discussion Mr. Emery pointed out that it is misleading to refer to refractory costs in relation to tons of metal melted. Variations in size of heats make it preferable to base costs on number of firing hours to obtain true comparisons.

A Malleable Furnace Refractory Cost Reduction Program, by Fred J. Pfarr and Albert S. Johnson, Lake City Malleable Co., Cleveland, was presented by the latter. Mr. Johnson, in outlining how his company has cut refractory costs, explained that varying operating conditions and furnace designs among different foundries prevent universal use of any one refractory application.

Lake City employs a sub-bottom for its air furnace, over which a 2-in. silica sand cushion is spread, topped by a service bottom of superduty large 9-in. straights. One section which developed a particularly short life uses an 80 per cent alumina brick.

Type of refractory and method of construction for side walls were selected after many tests. They have resulted in actual saving over a one-year period of more than $30 per heat compared with previous practice, regardless of tonnage melted. The walls are built to just above the slag line with large 9-in. straights backed up with a 4½-in. lining of regular 9-in. straights. Remainder of the wall is made up of 2½ x 6 x 13½-in. straights. The latter are high heat duty, stiff mud brick, and although more expensive than either the regular or large 9-in. straights, their use has cut costs. Lining life was extended to 15 to 19 heats compared with 10 previously.

This type of side wall construction was described in detail by Mr. Johnson in FOUNDRY, June, 1954.

At the second refractory session, a paper on **Forehearth Refractories for Soda Ash Desulphurizing** by Sam F. Carter and Ralph Carlson, American Cast Iron Pipe Co., Birmingham, was presented by Mr. Carter. Mr. Carter reported on service tests made over a seven-year period. Data were compiled on 7 types of brick, 8 mortars and 20 ramming mixes to determine their effectiveness in resisting corrosion by soda ash desulphurization.

Charted performance was offered on all materials tested, and it was concluded that no one material was best for all conditions but that some materials were economical and acceptable for some applications while completely unacceptable for others.

High-Duty, Super-Duty, and High-Alumina Refractories in the Foundry was the subject of F. H. Fanning, Harbison-Walker Refractories Co., Pittsburgh. Mr. Fanning briefly discussed the four principal methods of manufacturing standard brick sizes and special shapes—power press, extrusion, air ramming and hand molding—to assist the foundryman in se-

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lecting the correct material for specific applications.

Slides and tables of physical properties pointed out certain advantages for all four methods of manufacture. The speaker suggested that foundrymen can save money and improve refractory life if they will avoid use of large intricate shapes wherever possible and use standard sizes when designing refractory linings. It pays to examine the labor cost of installing standard and special shapes. Sometimes a higher grade refractory or the same grade refractory produced by another process will improve service life sufficiently to justify higher manufacture or material costs.

The official exchange paper from the Institute of British Foundrymen, Australian branch (Victoria), **Monolithic Converter Linings,** by J. Davies, Messrs. Davies & Paird Pty., Ltd., Melbourne, Australia, was read by title only.

GRAY IRON SHOP COURSE

TWO shop course sessions covered the practical inoculation of cupola melted irons and efficient cupola operation. Discussion leader at the first session was Harold E. Barnum, service engineer, Vanadium Corp. of America, Detroit, who presented a paper on **Practical Inoculation of Cupola Melted Irons.**

Mr. Barnum stated that with a general increase in use of gray iron today, it is possible to develop optimum metal properties through careful inoculation of the melt. He pointed out that a sound base practice must be established first so that the same results are obtained melt after melt. Then an inoculation program can be instituted using the accepted graphitizing and stabilizing elements that will provide the desired metal.

The speaker suggested it is best to make additions at the spout as ladle is being filled. Inoculants can be added to the ladle after filling, although this was not recommended as the best method. A pouring temperature around 2700° F was given as best for a completely inoculated melt, with a suggestion that the metal be poured as hot as the casting will stand. He also remarked that the inoculants should be given ample time (determined from experience) to work, that the volume measures should be accurately checked and the weight of all ladles used should be known to avoid improper mixtures.

In subsequent discussion it was pointed out that an inoculant does not make a good iron out of bad but is intended to better the properties of good metal. Other subjects discused were test bars and wedge testing, melting procedures, pros and cons of low aluminum-ferrosilicon additions, superheat, under cooling and machinability of various types of microstructures.

Efficient Cupola Operation was the subject at the second gray iron shop course. E. E. Pollard, Tyler Pipe & Foundry Co., Tyler, Tex., stimulated discussion by outlining a few points affecting cupola efficiency. Some of the topics discussed included methods of unloading charge materials and methods of making up charges.

Melting control included comments on pyrometer, slags and desulphurization processes. Air weight control was covered, as were bed heights, inoculation, refractories and water-cooled linings.

PLASTER MOLD CASTING

ABOUT 60 persons attended the plaster mold casting session to hear three papers covering production of flexible-faced coreboxes, surface and internal bubble control in poured investment plasters and the influence of vibration on fluidity and filling during investment casting of an aluminum alloy.

R. F. Dalton, research director, Howard Foundries, Chicago, in his paper, **Production of Flexible-Faced Core Boxes for Metal Casting Plaster Cores,** indicated that rubber-lined coreboxes for plaster molding are easy and economical to make; their production is a pouring operation rather than a tool room or machine shop operation. No core driers are needed because of the high green strength of plaster. No separator or parting agent is used. Because of the flexibility of rubber, the corebox may be designed to include no draft and even back draft.

Because three materials are involved, care must be taken that the ingredients are thoroughly mixed but not whipped. Whether poured hot or cold, the rubber composition is subject to some small shrinkage due to evaporation, changes in humidity and other factors. In aging, the rubber will shrink about .001-in. per in. in nine months.

Paper concluded with a presentation of slides detailing the steps to be taken in producing a flexible-faced corebox, using a cold-setting multi-component rubber.

Surface and Internal Bubble Control in Poured Investment Plasters was the subject of a paper presented by Robert G. Megaw, United States Gypsum Co., Chicago. While there are several requirements of a satisfactory plaster mold for metal casting, the author limited his paper to an investigation of methods necessary to provide good casting surface and detail through control of external and internal bubbles in the mold.

Tests were made of various practices of bubble control and results were charted. Parting compounds were studied, tested and evaluated and results included in recommended procedures. Permeability in foamed metal casting plaster molds is dependent upon incorporation in the mold of many small interconnected air cells. Mixing operation is vital in obtaining a proper slurry. Correct techniques of mixing were discussed and illustrated.

Author concluded by saying that good sound castings can be produced in permeable casting plasters if proper controls are exercised so that 1) surface bubbles are ruptured to insure good surfaces and 2) internal bubbles are small and interconnected, uniform in size and dispersed evenly throughout the mold. These requirements are best met by coating of pattern surface with an appropriate parting compound and blending of a separately generated foam with the plaster slurry.

The session concluded with a paper on the **Influence of Vibration on Fluidity and Filling During Investment Casting of an Aluminum Alloy** by D. W. Levinson, A. H. Murphy and W. Rostoker, Metals Research Department, Armour Research Foundation, Illinois Institute of Technol-

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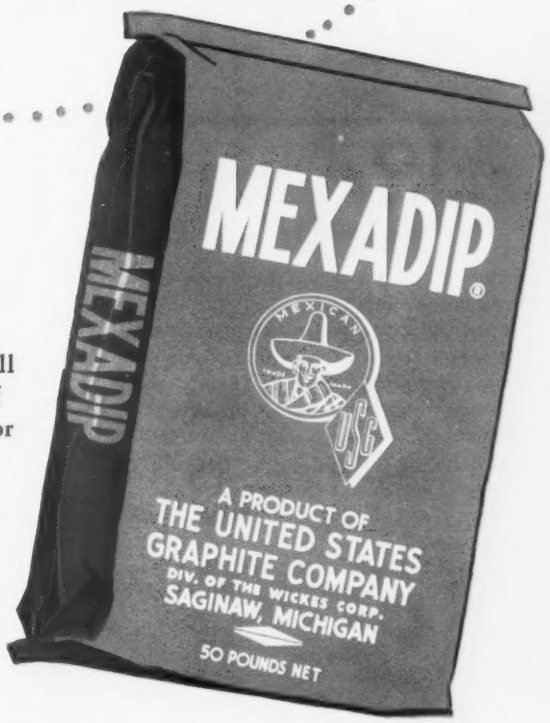

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ogy, Chicago. Paper was given by Mr. Levinson.

The effects of mechanical vibration during freezing on the apparent fluidity of three aluminum alloys (7 per cent Si, 4 per cent Cu, and 10 per cent Mg) were evaluated. The alloys were chosen on the basis of their representation of three degrees of suitability for investment casting. It was found that the ability of molten aluminum to enter and flow through small channels was increased through vibration, with the intensity of vibration governing the amount of improvement which was obtained from the action.

It was concluded from the experiments that the flow of metal into and through smaller than normal channels when vibration was a factor was enhanced by a break-up of surface films which would otherwise stop or impede the metal flow. Since surface oxidation can result in an apparent high surface tension, low-frequency vibration can most likely be employed to improve fluidity where the rate of freezing is not the controlling factor.

MALLEABLE IRON

ACTIVITIES of the Malleable Division embraced three technical sessions, a roundtable luncheon and a two-session shop course. Good attendance and exceptional interest featured all events.

First of two papers at the opening technical session was **Effects of Trace Amounts of Tin, Lead and Antimony on Annealing of Blackheart Malleable Iron,** by R. C. Shnay, Department of Mines and Technical Surveys, Ottawa, Ont., and J. E. Rehder, Canada Iron Foundries, Montreal, Que.

In abstracting the lengthy research report, Mr. Shnay stated that within the concentrations studied none of the three elements appears to have an appreciable effect on first-stage annealing. Trace amounts of lead up to 0.029 per cent do not have a direct effect on second-stage annealing. Antimony appears to promote graphitization, reaching a peak at about 0.003 per cent. This effect decreases to a minimum somewhere between 0.004 and 0.010 per cent, and increases sharply as the concentration is increased.

Tin also appears to have a graphitizing effect which reaches its peak at about 0.014 per cent and then decreases sharply until a concentration of around 0.020 per cent is reached. As the tin concentration is increased above 0.020 per cent, it appears likely that the rate of annealing gradually decreases. The speaker observed that tin and antimony appear to act on the rate of second-stage annealing through different mechanisms.

G. E. Kempka, project assistant, Department of Mining and Metallurgy, University of Wisconsin, Madison, Wis., contributed the second paper, which reported on **Embrittlement, Toughening and Subcritical Thermal Treatment of Malleable Iron.** Among conclusions were that slow cooling from around 1200° F results in a low level of possible strengths, and a susceptibility to embrittlement; rapid cooling from the same temperature results in a high level of possible strengths and a resistance to embrittlement.

Further, according to Mr. Kempka, embrittlement after heating to 800-900° F and water quenching occurs to the greatest degree in high-phosphorus irons which previously had been cooled slowly from around 1200° F. Maximum ductility may be obtained by rapid cooling from around 1100° F or above. An embrittled iron may be strengthened and a strengthened one may be embrittled by subcritical thermal treatments.

It was the author's conclusion also that the effects of strengthening and weakening malleable iron by subcritical thermal treatments are great enough to mask property variations from other sources. Irons not considered susceptible to embrittlement because of their safe composition can become partially embrittled through suitable subcritical temperature thermal treatment.

The second session on malleable iron featured a report on research and a practical discussion of duplex melting. **Effects of Some Melting Variables on the Properties of Malleable Iron,** a progress report on an AFS-sponsored research project, was prepared by G. E. Kempka and R. W. Heine, University of Wisconsin, Madison, Wis., and presented by Professor Heine. The report indicated that water vapor in melting furnace gases causes a serious lowering of elongation and tensile properties, but exerts only a mild effect on the yield point. Water vapor showed little effect on first-stage graphitization time, but second-stage graphitization was affected adversely by water vapor.

Data presented in the report show that ductility and tensile strength are decreased, while yield strength is little affected as sulphur content of malleable iron increases in the range of 0.04 to 0.21 per cent. Second-stage graphitization was altered by the sulphur level. Increasing the carbon and sulphur percentages reduces the slope of the stress-plastic strain curve and available ductility. Water vapor in the melting furnace atmosphere reduces the slope of the stress-plastic strain curve. The report also dealt with the effects of melting variables and the role of nitrogen in malleable iron.

Metallurgical Controls for Duplexing Malleable, presented by L. E. Emery, Marion Malleable Iron Works Division, Chicago Railway Equipment Co., Marion, Ind., featured a practical discussion of more rigid controls. Mr. Emery stated it is most important to keep the graphitic carbon content under control. Type of scrap also is important; his organization charges 12 per cent plate scrap, 44 per cent angle bars and 44 per cent shells or forge crop ends—all low-phosphorus material.

If the steel content is held constant, there will be a minimum of variation in annealability, but if the steel content is increased, a marked increase in hardness and change in structure result. Tear and shrink is increased after reaching 40 per cent steel in the mixture. The speaker advised checking microstructure and residual alloy content of the pig iron used.

Mr. Emery stated that excessive oxidation in cupola operations and excess air in the cupola affect castability and annealability. Variation in nodule shape and size was quite marked and the number of nonmetallic inclusions was increased in iron melted under severe oxidizing conditions. Fluidity of molten metal was reduced when FeO content of the slag was highest.

The speaker stressed the importance of temperature control, and stated the use of a combustion instrument in conjunction with flame temperature has been helpful. Desulphurizing is practiced by his organization, and has been found to pay off. Keeping sulphur low provides cleaner metal and a refined grain, and keeps tears at a minimum. Sulphurs are kept under 0.15 per cent, with every effort made to hold it from 0.10 to about 0.12 per

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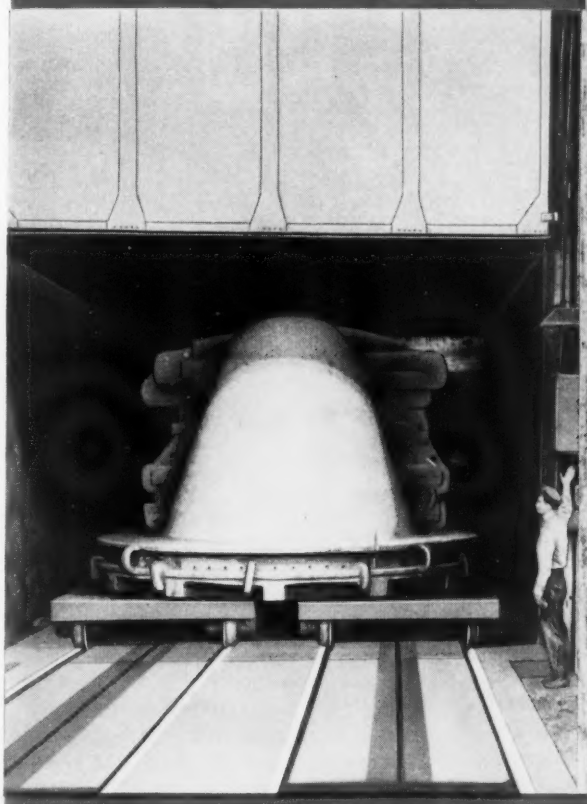

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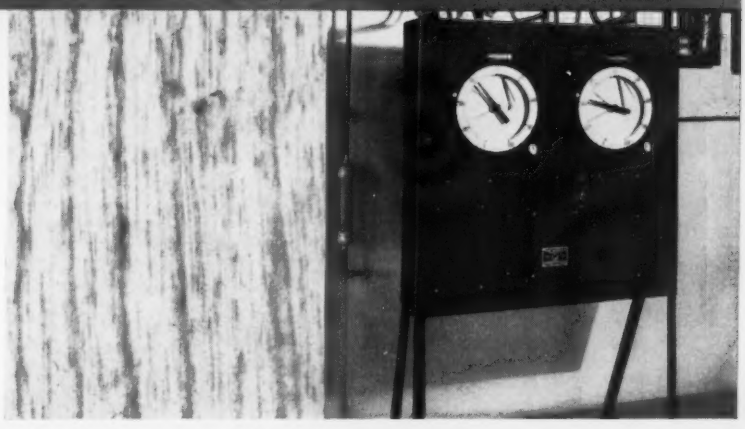

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cent. Mr. Emery also discussed importance of size and properties of melting coal.

Two papers presented at the third and concluding malleable session dealt with pearlitic malleable. J. E. Kruse, Albion Malleable Iron Co., Albion, Mich., presented the first on **Interrelation of Heat Treatment, Mechanical Properties and Machinability of Pearlitic Malleable Iron.**

The speaker summarized that the best mechanical properties are obtained in oil-quenched and drawn material. There is a definite relationship between mechanical properties and microstructure. It was observed also, Mr. Kruse stated, that machinability is a function of yield strength.

In the second paper, W. G. Scholz and D. V. Doane, Climax Molybdenum Co., Detroit, considered **Effects of Molybdenum on Stability and High Temperature Properties of Pearlitic Malleable Iron.** Mr. Scholz commented that not all of the elements added to ferrous metals to produce high-temperature properties can be added to pearlitic malleable effectively for the same purpose, but molybdenum can be.

Additions of molybdenum studied in the investigation were 0.01, 0.19, 0.32, 0.51 and 0.75 per cent. Among examples where pearlitic malleable needs good high-temperature properties are diesel engine pistons. Physical properties were measured after periods of 1 hour, 96 hours, 500 hours and 1000 hours at temperatures of 1000, 1100 and 1200° F. Conclusions reached by the authors were that in the temperature range considered, the addition of molybdenum improves the mechanical properties and its use does not interfere with the normal processing of pearlitic malleable.

Principal speaker at the Malleable Division roundtable luncheon was B. C. Yearley, National Malleable & Steel Castings Co., Cleveland. His topic was **Producing Solid Castings with Minimum Cost for Feeders.** Before getting into the technical aspects of this subject, Mr. Yearley reviewed changes which have taken place in markets for malleable castings in the past quarter century.

The railroads, the largest user of malleable castings in the early days, have switched to steel castings as high speeds and heavier loads have required stronger materials. Likewise, today's automobiles use fewer malleable castings per car. Supplanting these former markets now are tractors, agricultural machinery and automatic transmissions for automobiles.

As the production of malleable castings has become more competitive, the industry is confronted with the necessity of making a better product and at reduced cost. According to Mr. Yearley, both of these ends can be accomplished by using the smallest possible feeders that will provide sound castings. The savings are obtained by reducing the percentage of castings which must be scrapped and the volume of molten metal that goes into feeders.

The speaker approached the subject scientifically, relying heavily upon research which has been done in studying the mechanism of freezing of metal in a mold. Knowing how the metal will freeze and the exact need for a reservoir of molten metal to offset contraction of the metal as it cools, feeders can be designed properly as to size and location in the mold. This gain in efficiency will promote economy, in Mr. Yearley's opinion.

SAND SHOP COURSE

TWO shop course sessions were included in the extensive program sponsored during the convention by the Sand Division.

Fitting Sand Control to Your Foundry was the first session's topic. It was discussed by a panel of three with F. S. Brewster, Brumley-Donaldson Co., Los Angeles, as moderator. Panel members included T. C. Alford, Wheland Co., Chattanooga, Tenn., F. W. Jacobs, Texas Foundries Inc., Lufkin, Tex., and Harry Wilson III, Foundry Division, Electron Corp., Littleton, Colo.

The panelists described important features of sand practice at their foundries. Properties of the sand regarded as most important include moisture, flowability, green strength and deformation. One foundry tests for moisture each 15 minutes and checks for carbonaceous material hourly. It was pointed out that sand analysis provides an important tool for regulating casting properties; keeping values within established limits will help considerably in preventing defects.

Sand Preparation Without Guesswork was the discussion topic at the second Sand Shop Course session. Constituting a panel were William E. Patterson, Elkhart Foundry & Machine Co., Elkhart, Ind., and A. R. Downey, International Harvester Co., Indianapolis, with Mr. Brewster again serving as moderator.

Mr. Patterson described the Dietert system of automatic sand tempering in use at his plant. The system processes 200 tons of sand per day, the mullers being loaded with skip hoists equipped with electronic probes which determine the moisture content of the sand. The required water is added automatically to the sand in the mullers. Operation is on a 40-second cycle.

The speaker pointed out that the system has almost completely eliminated scrap castings attributable to high or low sand moisture. Biggest saving, however, has been the release for other duties of one supervisor in the mulling operations. Constant sand moisture benefits slinger operations. Water goes into the muller before the sand and experience is that muller maintenance has been reduced.

Mr. Downey explained that an automatic sand conditioning system was a logical place to start automating International Harvester's Indianapolis foundry. The Haylco system which was installed employs batch hoppers to load the mullers to provide uniform batches. Seacoal, bentonite and other sand additions are introduced as a slurry, the proper amount being predetermined and remaining constant. Water additions in the muller are determined by electronic testing of the sand in each batch. Sand is mulled 3 minutes.

The automatic sand tempering system is operated by three men, Mr. Downey stated. The old system required the services of ten men; thus it was possible to transfer seven to other work. Although relatively new, the system is giving good results, the speaker reported and further experience is expected to enhance its value.

In opening the meeting to floor discussion, Mr. Brewster asserted that a completely automated sand system is feasible and is just around the corner. It would require only maintenance men, he said.

Discussion brought out that so far automatic sand tempering systems have not incorporated means for cooling sand, a feature which some foundrymen feel would be a requisite in their shops. Such features can be included, it was stated, if they actually are needed. Commenting on this matter, Harry W. Dietert, Harry W. Dietert Co., Detroit, explained

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that hot sand is losing heat constantly in the muller and on belts. Cooling also is accomplished, he contended, by adding enough water to allow for evaporation during the process of mulling.

Another issue which arose in discussion was a doubt whether jobbing shops, which lack uniformity in casting sizes and types, as compared with captive shops, can justify installation of automatic sand preparation systems or find them a benefit. Sometimes a variety of sand mixtures is used. Mr. Patterson pointed out that the foundry with which he is associated is a jobbing unit and installation of the system has been justified. Others expressed opinions that jobbing shops can profit by automatic systems. One or two contributed the view that jobbing foundries might benefit by standardizing on one or very few sand mixtures.

The session could be summed up as a fully favorable appraisal of automatic sand tempering and a step in automation that promises fast growth.

BRASS and BRONZE

IN THREE technical sessions and a roundtable luncheon brass and bronze foundrymen listened to and participated in discussions on producing sound castings, elevated temperature properties of copper-base alloys and precision casting of small propellers. At the opening session George Dalbey, Mare Island Naval Shipyard, Vallejo, Calif., described **Feeding of Castings,** which was investigated in co-operation with Thorton C. Bunch. Alloy was Navy "M" or 86-6-1½-4 and plates 1⅛ x 6½ x 16 in. were poured with and without risers. Test specimens were taken at various sections for x-ray examination and physical property determinations. Thermocouples also were inserted in the plates at several points for temperature determinations. It was found that better feeding was obtained with plain risers than without, and much improved feeding occurred when insulation was applied to risers. Physical properties increased with better feeding.

The authors also cast wedge-shaped plates 2¼ in. thick at the ingate end tapering to 1⅛ in. with and without risers, and found more improvement in feeding and physical properties as compared with the respective conditions in the uniform thickness plates.

Vapor Holes in Brass and Bronze Castings from Loose Sand Grains by W. B. George and Floyd Keller, R. Lavin & Sons Inc., Chicago, was presented by Mr. George. The authors indicated that dry sands heated to 1800°F lose weight. This they believe to be loss of moisture, so that any loose particles of sand left in a mold cavity can develop vapor or gas holes when imbedded in the casting. In experiments using clean molds and molds containing small amounts of dry sand filled with the 85-5-5-5 alloy poured at 1800° to 2200°F in 100° increments, no vapor holes were encountered in clean molds with pouring temperatures as low as 1800°. However, in molds containing loose dry sand, holes occurred with metal at 1800 and 1900°F, but not at 2000° and above. The authors attributed that effect to higher fluidity of the alloy which flushed the sand particles to the surface of the casting where they were machined off.

In written discussions by Douglas C. Williams, Ohio State University, Columbus, O., and Robert A. Colton, Federated Metals Div., American Smelting & Refining Co., Barber, N. J., it was pointed out that, instead of the gas holes being caused by moisture on the sand particles, the latter acted as focal collecting points or nucleators of gases already in the alloy, and inquired if any gas analyses or estimations had been made.

Second session dealt with vacuum degassing and microporosity. First paper, **Improvement of Pressure Tightness and Tensile Properties of Gun Metal Bronze by Vacuum Degassing** by H. F. Bishop, W. S. Pellini and W. H. Johnson, Naval Research Laboratory, Washington, was presented by Mr. Johnson. Alloy used was 88-8-4 melted in oil-fired or induction furnaces, heated to between 2200 and 2600°F, and poured at 2000°F. The authors found that melts subjected to a 6 to 10-minute degassing treatment resulted in a two to three-fold increase in probability of developing a high order of pressure tightness, an increase of about 10,000 psi in tensile strength, and 100 per cent in elongation.

In the discussion the question was raised on temperature drop during degassing, and the reply was that it was moderate, but the metal must be superheated accordingly. Attention was directed to the efficacy of the oxidation-reduction procedure for minimizing gas pickup. It also was pointed out the melts not degassed were not superheated much above the pouring temperature, and previous investigation by Ames had indicated that better physical properties were obtained with superheats around 2350°F.

Problem of **Microporosity in Gunmetal Pressure Castings** was the subject of a paper by Alfred Hesse, Stemac Inc., Chicago, Marvin Glassenberg, Armour Research Foundation, Chicago, and William H. Baer, Bureau of Ships, Washington. Presented by Mr. Hesse, the paper described an investigation of pouring temperatures and gating methods to minimize microporosity in a ring type casting about 14 in. in diam and weighing about 38 lb which had to be pressure tight. Molded in green sand, a circular gating system with eight equidistantly spaced openings into the lower flange was used. In the discussion several foundrymen making the same type of casting stated that the only way they could eliminate the lack of pressure tightness was to turn the casting over and use chills on the sections where trouble occurred.

Concluding technical session considered elevated temperature properties and the casting of propellers. These subjects were described in **Short-time Elevated Temperature Properties of Three Copper-base Casting Alloys** by J. O. Edwards, Department of Mines and Technical Surveys, Ottawa, Ont., and **Investigation of Precision Casting of Experimental Propellers** by A. R. Willner, Seymour Goodman and Charles L. Tippett, David Taylor Model Basin, Washington.

The first paper, presented in the absence of the author by James S. Vanick, International Nickel Co. Inc., New York, gave data on three alloys tested at 550, 600 and 650°F. Two of the alloys contained nickel; their compositions were 88 Cu, 5 Ni, 5 Sn, 2 Zn, and 80 Cu, 5 Ni, 5 Sn, 5 Pb, 5 Zn. The third alloy contained 88.5 Cu, 6 Sn, 1.5 Pb, 4 Zn. All test bars were aged at 550°F for one week prior to elevated temperature testing. Some nickel-containing alloy specimens also were heated to 1400°F for 5 hours and quenched or air-cooled, and aged. From data secured the author concluded that nickel additions confer improved strength at elevated temperatures, and that the alloys would be suitable in castings operating in temperatures around 550°F.

William H. Baer, Bureau of Ships, Washington, briefed the contents of the paper on propellers. He pointed

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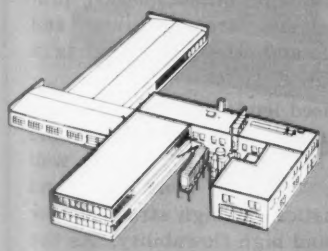

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out that, through the procedures developed, time required for producing a 16-in.-diam propeller had been reduced to 40 man-hours from about twice that by previous methods.

The brass and bronze round table luncheon on Monday drew an exceptionally large attendance. The formal program was a discussion by William A. Meissner, assistant director, Copper Division, Business & Defense Services Administration, Washington, entitled **Functions of the Copper Division of BDSA.**

Mr. Meissner stated that the administration of the defense materials system, a modified controlled materials plan, is the most important activity of the defense function of BDSA. This system provides that the military and the Atomic Energy Commission will obtain their requirements of basic materials, and assures industrial organizations that they will not have more than their proportionate share of defense business forced upon them, unless they desire more. The BDSA also participates in stockpiling, determines the ability of existing facilities to meet emergency needs, and grants tax amortization certificates.

Mr. Meissner emphasized that service to business does not mean taking the place of legitimate trade associations, running errands for business or doing anything for business that it can do for itself. Service to business means giving industry a main point of contact in government to express its viewpoints and opinions. The BDSA is then to make available any pertinent data or information which may help business. He pointed out that the responsibility of the Copper Division is to foster the maintenance of a strong, healthy copper industry so that it can do a better job in normal times as well as in any emergency.

According to Mr. Meissner, the Copper Division has recommended that the export of copper-base scrap be reduced drastically, and has succeeded in curbing these exports to make more scrap available for foundry operations.

Following the pattern of recent round table luncheons of the Brass & Bronze Division, those in attendance were divided into small groups for discussion of a number of questions. This was followed by a general discussion. Topics given most consideration were the melting and casting of high-tensile bronzes, and use of several types of melting furnaces in the production of copper-base alloys.

Use of chills and strainer cores in production of aluminum bronze was mentioned. It was indicated that with proper care to details, there should be no trouble in producing nickel-aluminum bronzes. In the melting discussion, the various advantages and problems of melting with the indirect arc furnace, low and high frequency induction furnaces, crucible and open-flame gas and oil furnaces and coke-fired furnaces were covered.

PATTERNMAKING

SESSIONS for patternmakers opened with a luncheon meeting on Wednesday, followed by two other meetings. Topics discussed included sealing coreboxes, pattern construction, plastic patterns, research, high-pressure molding and metal pattern production.

At the luncheon Richard L. Olson, Dike-O-Seal Inc., Chicago, spoke on **Sealing Metal Coreboxes Against Blow-by.** In the process developed by the author matching grooves are machined in the faces of the corebox halves. A synthetic rubber seal is vulcanized permanently to one half and extends up into the groove in the other half. According to Mr. Olson, blow-by is eliminated even if the faces of the boxes are a few hundredths of an inch apart.

In discussing **Wood Pattern Construction Standards and Specifications,** John F. Roth, Cleveland Standard Pattern Works Inc., Cleveland, stated that in general patterns are classified into first, second and third grades according to expected service. The first grade includes those which will be in active use for long periods of time, and should be made of mahogany and sturdily constructed. Pieces making up the pattern should be glued or screwed together and face-nailed. Large round sections should be stave-formed. Corners should be carefully filleted, and suitable rapping plates must be attached. Numerous other details regarding construction were given, including final coating which he suggested be in the standard colors.

About 45 persons attended the first pattern session to hear M. K. Young, United States Gypsum Co., Chicago, discuss **Gypsum Cement Molds for Plastic Patterns.** Mr. Young stated that a good molding plaster must have four characteristics—economy, accuracy, adaptability and dimensional stability. He covered several plaster molding techniques which reportedly are quick, accurate and inexpensive. Slides were shown illustrating production methods in use in various shops.

The second paper was presented by David T. Kindt, Kindt-Collins Co., Cleveland, on **Research in the Patternmaking Industry.** He said that the patternmaking industry is on the threshold of a new era, and training and research are essential to meet future needs. An elementary search for knowledge is not the answer; a systematic, scientific approach is required if the industry is to keep pace with today's growth.

Using a pattern coating as an example Mr. Kindt explained how research develops, but said that continuing work must be done on glue, waxes, woods, plasters, plastics, impregnators and other materials. A color film, "A Study of Research," was shown highlighting the research laboratories of E. I. duPont de Nemours Corp., and the work done to develop and manufacture the synthetic fabric, orlon.

At the final session, T. E. Barlow, Eastern Clay Products Dept., International Minerals & Chemical Corp., Chicago, talked on **High Pressure Molding.** Speaker stated that pressures of 100-600 psi will provide precisions equal to or better than those attained by any other method provided patterns are accurate and flasks, pins and other equipment is in good condition.

Sands used lend themselves to high as well as low pressure squeeze and the same sand will work equally well for both. Desired synthetic sand characteristics are high strength, low moisture and high flowability. As the squeeze is straight there is no need for heavy equipment or excessive reinforcement. Up to the present work done by this method generally is cope and drag, although one or two instances of matchplate work have been successful. Patterns can be of wood, metallized wood, plastic or vertically laminated plywood, since there is no jolting or abrasive action.

A paper on **Precision Patterns from Zircon Molds** by J. E. Stock and A. V. Schoville, John Deere Waterloo Tractor Works, Waterloo, Iowa, was presented by Mr. Stock. Mr. Stock described in detail and showed slides illustrating the methods used by his company in making gray iron patterns to precision tolerances in zircon sand molds. All patterns used for molding by slingers or jolt-rollover machines have been made by the described techniques. Mr. Stock stated

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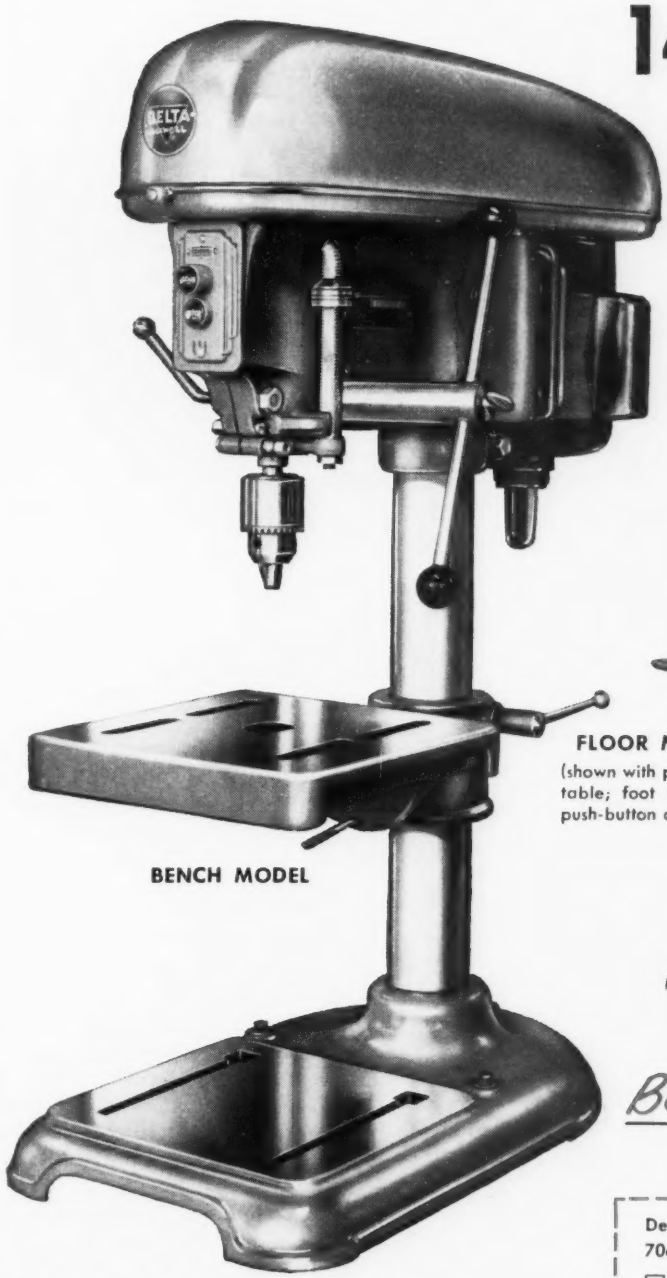

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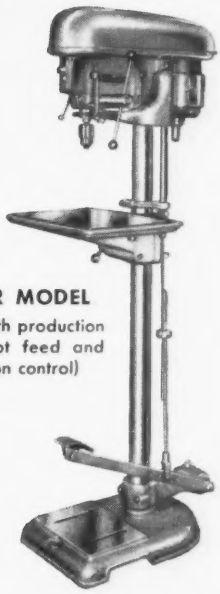

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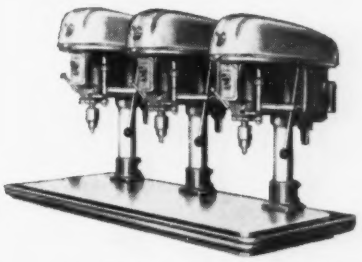

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that use of regular foundry facilities, equipment and supplies places the method within reach of those interested in reducing amount of time required to produce a finished pattern from a completed wood master pattern. Considerable time is saved in finishing, and other costs are comparable to those encountered with any jobbing casting. As an example of time saved in finishing, one cope and drag pattern casting made with ⅛-in. finish by conventional methods required 382.2 hours of finishing time compared with 68.5 hours when patterns were cast to size in zircon molds. Roughly, cast iron patterns without finish allowance take only one-fifth or less the finishing time of those cast conventionally.

PLANT EQUIPMENT

ONE technical session was devoted to plant and plant equipment and included two papers. **Shell Molding Process and Equipment** by Carl O. Schopp, Link-Belt Co., Indianapolis, and James Sutherland, Link-Belt Co., Chicago, was given by Mr. Schopp.

The paper briefly outlined the dump box method of shell making and the supporting methods used during pouring. Various types of dump box molding machines offered by different manufacturers also were described. A description of shell mold foundry layouts completed the presentation. Mr. Schopp concluded that shell molding offers good working conditions and the use of relatively unskilled labor to produce castings with good finish, close dimensional accuracy and intricate design. By taking advantage of these benefits the industry is placed in a better competitive position with machining, forging and welding operations.

Mr. Schopp then showed a color, sound film of the shell mold foundry at Link-Belt in Indianapolis. This operation was described in FOUNDRY, April, 1955.

During discussion it was pointed out that some foundries are producing two 75-lb castings in one shell mold. It also was stated that castings produced in a fully mechanized shell molding foundry would cost about 5 per cent more than in a fully mechanized sand foundry. On the other hand castings from a mechanized shell foundry are cheaper than those from a green sand hand molding operation. Finally it was pointed out that the blowing of shell molds and cores is fast finding a place in shell molding, but it will not exclude dump-box methods. However, blown shell cores are being used in increasing numbers in green sand molds.

The second paper was a brief introduction by H. C. Weimer, Beardsley & Piper Div., Pettibone Mulliken Corp., Chicago, for a film, **Mechanization for Small Foundries.** Operations in 12 different foundries were pictured. Included in the operations shown were sand conditioning; coremaking on blowers and other types of machines and the use of auxiliary equipment for increasing core production; and molding, including the use of various types of machines as well as slingers and turntable operations.

INDUSTRIAL ENGINEERING

THE Industrial Engineering Division sponsored a roundtable luncheon and one technical session. About 40 persons attended to hear three papers covering production standards, methods of improving foundry paper work and the effect of hidden fixed costs on profit and loss.

At the technical session, Stuart D. Martin, manager, production control and standards, Central Foundry Division, General Motors Corp., Saginaw, Mich., discussed **Production Standards and Their Place in the Foundry Industry.** In his paper Mr. Martin shared the experiences of his company over a three-year period in formulating and establishing production standards at three plants on over 1000 parts, ranging from small brackets to motor blocks, cast in several grades of gray iron and malleable iron.

The speaker suggested that with labor costs increasing, and new processes and materials being developed and injected into an ever-increasing competitive picture, the study and installation of a production standards program offers the industry a means of meeting the challenge.

Out of the experience of GM with the program, Mr. Martin emphasized several points that developed from their installation of the standard time hour program: 1. Management receives more accurate reports on plant performance, operating efficiency, manpower utilization and costs. 2. Costs accumulated on any casting reflects true performance for that part, good or bad. 3. Detailed analysis of each part in production gives data for accurate cost estimating. 4. Employee performance can be observed daily. 5. Knowledge of true production costs makes possible accurate, equitable and more relative selling prices. 6. Quality is improved and can be maintained to higher standards because of more consistent production methods.

A paper, **Improving Foundry Paperwork,** by M. E. Mundel, vice director, management center, Marquette University, Milwaukee, was presented by J. E. Westover, Westover Engineers, Milwaukee, in the absence of Mr. Mundel. The paper pointed up the need for management to examine its communication system as a prelude to its improvement. Possible changes in the design or layout of forms or letters, the manner in which each individual job in the communication system is performed, the path taken by a communication, and who does what in the communication procedure can all stand scrutiny in the light of their correctness, timeliness and cost.

A close examination of the communication processes undoubtedly would result in considerable savings by reduction of the amount of paperwork handled, and improvement in the style and content of information contained on each form required. An added asset and much desired by-product would be improved management performance resulting from a smoother flow of simpler, less complicated and better understood forms.

At the luncheon session, Milton E. Annich, director, industrial engineering department, American Brake Shoe Co., Mahway, N. J., presented a paper on **Your Hidden Fixed Costs and Their Effect on Profit and Loss.** Mr. Annich discussed by example, simplified charts and diagrams the breakeven point for a gray iron foundry having a normal production

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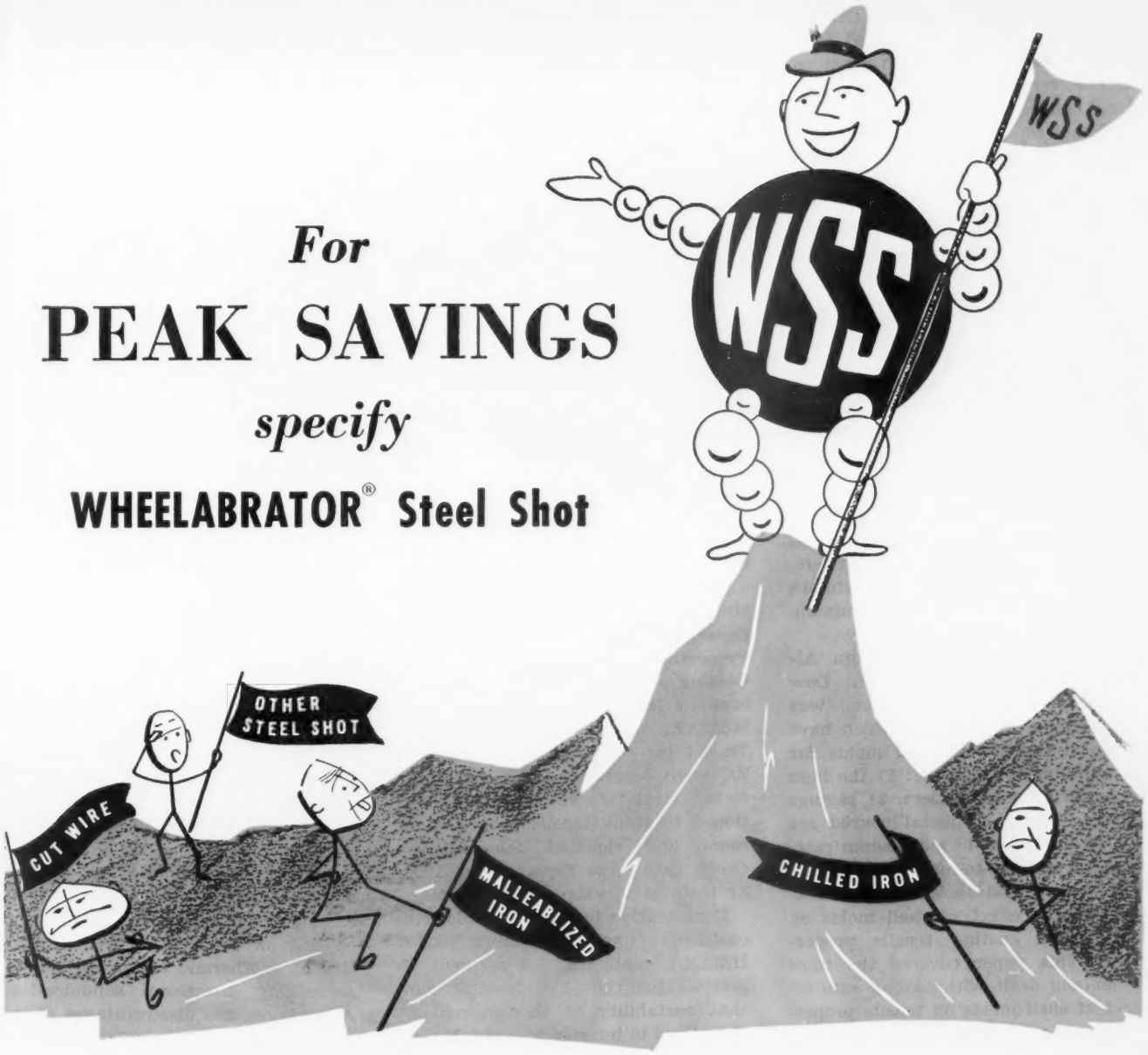

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of 150 tons per month. Certain other than normally considered fixed costs are shown to have an effect on the cost structure, and if not recognized, can cause loss of business. He also showed how the hidden fixed costs, when recognized, can be used to advantage in setting sales policy in a buyer's market.

In practical application, the foundryman must recognize that hidden costs do exist. Their presence can be determined by plotting monthly payroll and material costs against production costs. Information learned can be used to help weed out production inefficiencies and reduce these costs to the irreducible minimum. A realistic estimating and sales policy can be established, costs can be pared through close control and production efficiency increased by having a knowledge of actual cost factors.

LIGHT METALS

FIVE technical sessions and a luncheon were sponsored by the Light Metals Division. Subjects included shell molding, insulated risers, test bar evaluation, fluid flow studies and foundry practices for aluminum, magnesium and titanium alloys.

Shell Molding of Magnesium Alloys, by Nicholas Sheptak, Dow Chemical Co., Midland, Mich., was the first paper. Factors which have retarded the use of shell molds for magnesium castings are: 1) the high strength of resin binders, 2) savings in machining and metal poured are not as important in magnesium castings as in hard-to-machine iron and steel alloys, and 3) lack of information on the effect of shell molds on magnesium casting tensile properties. This paper covered the third point and dealt with cooling rate effect of shell molds on tensile properties of magnesium alloys. Tests were conducted on heat treated, unmachined bars.

Bars poured in shell molds with Mg-Al-Zn alloys at 1400°F had lower properties than green-sand cast bars. Cooling rate in green sand was as much as six times faster than in shell molds when both were poured at the same temperature. Reducing pouring temperature to 1275° F, using thicker shell molds and mold backing material increased the cooling rate of shell-cast metal and produced tensile properties comparable to those of green sand cast bars.

The insulating properties of shell molds should permit pouring thin-walled castings, use of smaller gates and risers, and lower pouring temperatures.

During discussion, J. W. Meier, Department of Mines and Technical Surveys, Ottawa, Ont., said that his work has shown that machining of the test bars has little effect on physical properties. Another person commented that strength of a casting depends upon rate of cooling more than on the mold material in which it is cast.

K. E. Nelson, Dow Chemical Co., Midland, Mich., presented the second paper, **Foundry Characteristics and Properties of the Magnesium Sand Casting Alloy HZ32XA.** Production castings poured in magnesium alloy HZ32XA, containing 3.0 per cent Th, 2.1 per cent Zn and 0.7 per cent Zr, were inspected for foundry defects. Heat treated parts were sectioned to study tensile properties at room and elevated temperatures. Creep data were reported for 1000-hr tests at elevated temperatures.

Comparative tests were made with castings from magnesium alloy HZ31XA, containing 3.0 per cent Th and 0.7 per cent Zr. Results show that castability of thorium-containing alloys is inferior to most Mg-Al-Zn alloys and to the Mg-RE-Zr alloys. HK32XA-T5 and HK31XA-T6 alloys have better creep resistance at elevated temperatures than all other commercial magnesium sand casting alloys.

Concluding paper at the opening session was **Mechanical Properties of Cast Titanium-Silicon Alloys.** Written by H. W. Antes and R. E. Edelman, Pitman-Dunn Laboratories, Frankford Arsenal, Philadelphia, it was presented by Mr. Edelman. Several cast titanium-silicon alloys, containing up to 3.06 per cent Si, were tested for ultimate and yield strengths. Tensile strength reached a maximum of 108,500 psi at 1.8 per cent Si but decreased to about 75,000 at 3.06 Si. Elongation decreased as silicon content increased, and the alloys became quite brittle when Si content exceeded 1.8 per cent.

Charpy impact energy was determined over a temperature range of —105 to 212°F for each alloy. Room temperature energy was highest at 46 ft-lb for the 0.07 per cent Si alloy, but unalloyed metal had the highest impact energy at all temperatures. Brinell hardness of Ti-Si alloys increased with small Si additions to a maximum hardness of 240 bhn at 2.5 Si.

In a written discussion J. G. Kura Battelle Memorial Institute, Columbus, O., said that silicon has an adverse effect on tensile strength of notched test bars.

Discussion also brought out that gas and metallic contaminants were eliminated for the test metal by melting in a helium-argon atmosphere and pouring into a graphite mold which cooled the melt so fast that there was no chance for pickup.

At the second light metals session W. A. Mader, Oberdorfer Foundries Inc., Syracuse, N. Y., presented the first paper, **Application of Insulated Risers to Production of Aluminum Alloy Sand Castings.** It was shown that riser efficiency can be improved by insulation to reduce heat losses by conduction and radiation. Insulation was achieved by using sleeves of permeable gypsum plaster and expanded pearlite, which is made by heating mineral pearlite to 1600-2000°F. Exothermic materials also were used as riser topping.

These materials aided in promoting directional solidification; shrinkage-free castings were produced and casting yield increased. Intelligent chilling, in combination with insulation or exothermic materials, aids in controlling directional solidification. Advantages and disadvantages of insulation and exothermic materials also were discussed.

In a written discussion, Michael Bock II, Exomet Inc., Conneaut, O., said that exothermic materials often raise metal temperature above that used in melting and may change casting grain structure. Oral discussion also brought out that exothermics sometimes develop gas directly under the riser with consequent effect on mechanical properties of the casting. It also was pointed out that insulation and exothermic materials contaminate molding sand.

Measurement of Gas in Molten Aluminum, H. Rosenthal and S. Lipson, Pitman - Dunn Laboratories, Frankford Arsenal, Philadelphia, was the concluding paper at the second session. It was presented by Mr. Lipson. A new apparatus for testing density of solidified samples of aluminum alloys was described. Tests may be performed with the apparatus in 30 seconds on samples measuring ⅞-in. in diam and 2½ in.

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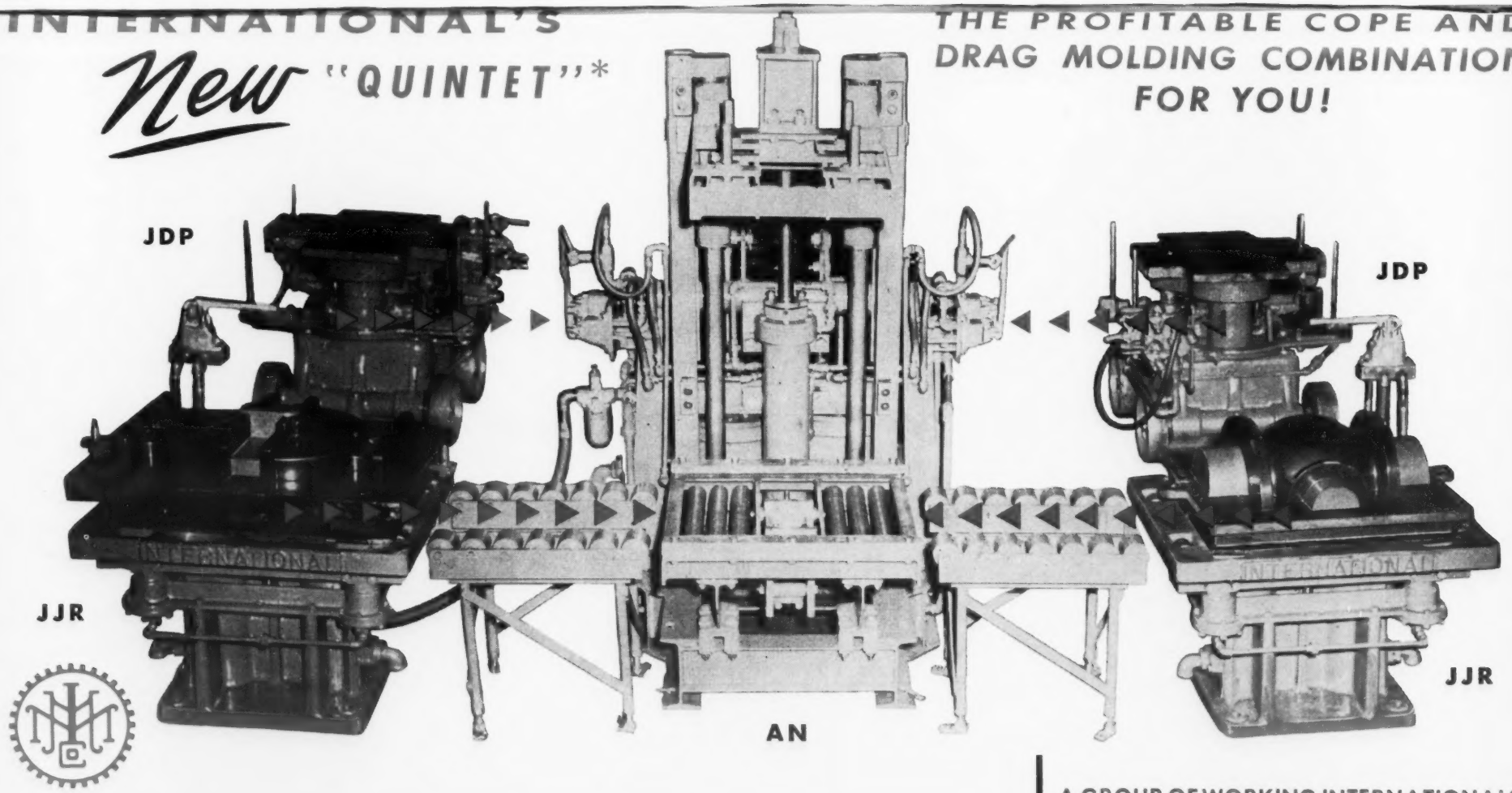

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long. The procedure involves testing a metal sample solidified in a reduced pressure atmosphere against a sample from the same melt solidified at atmospheric pressure. Difference in densities of the two will indicate the amount of gas in the original melt.

Significance of the new apparatus is in its speed. Because testing time is reduced, results give a better indication of gas content in the metal at time of pouring.

First paper at the third session was **The Meaning of the Cast Test Bar in the Evaluation of Aluminum and Magnesium Alloy Castings,** by A. G. Slachta and H. Mansfield, Wright Aeronautical Div., Curtiss-Wright Corp., Wood-Ridge, N. J. It was given by Mr. Mansfield. Tests were conducted on step-down test bars and compressor housing castings poured in Cu-Si-Al alloy AMS 4214 and RE-Mg alloy WAD 6495. Evaluations were made for tensile and yield strengths, elongation, Young's modulus, chemistry and fatigue properties.

Results indicated that properties of test bars were higher than those of the compressor housing. It also was shown that as grain size of the aluminum and magnesium alloys decreased, properties increased.

During discussion it was pointed out that casting soundness, rather than grain size, is the criterion in determining properties. With large grain size there may be greater porosity, although it was conceded that large grain size usually is associated with lower properties.

Second paper at this session was **Mechanical Properties of Aluminum Alloy Castings** by Roy E. Paine, Aluminum Co. of America, Vernon, Calif., and W. D. Stewart, Alcoa, Pittsburgh. Mr. Stewart presented the paper. He said that design is an important factor in the mechanical properties of castings. Separately cast bars are a useful phase of foundry control, but they do not represent properties of the casting. Static break-down tests in which the casting is loaded as in service give a better indication of strength and the effects of design and foundry practice.

Dr. Waldemar Schumacher of Germany demonstrates at Dee Brass Foundry Inc., Houston, how cores are hardened by the carbon dioxide process

Other factors which determine casting properties are chemical composition of the metal, rate and direction of solidification, casting soundness and heat treatment. Control of these variables offers the best way to improve castings.

Mold material also affects casting properties. Permanent mold castings are higher in yield and tensile strength and elongation than sand castings. Thin sections of the step-down test bar also are higher in the same properties. Sections machined from castings show the same trend but the differences are not as great. This is true for both sand and permanent mold castings.

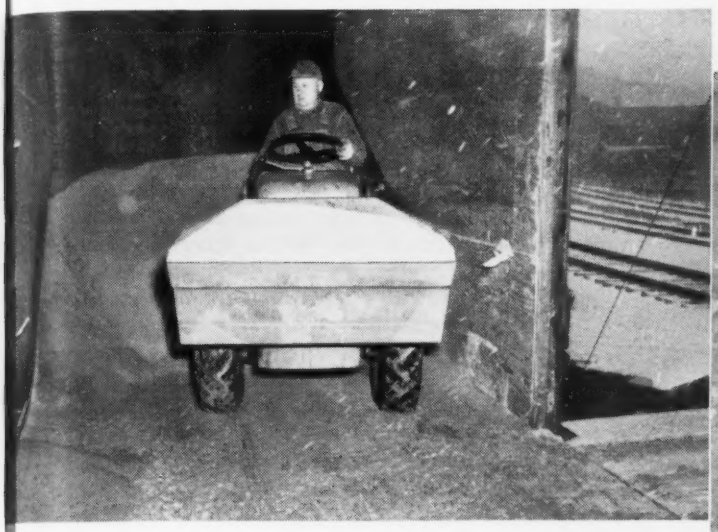
Fourth light metals session gave consideration to production of aircraft quality castings. In **Production of Aluminum Alloy Specification Castings** by R. E. Paine and P. V. Faragher, Aluminum Co. of America, Pittsburgh, and presented by Mr. Paine it was stated that preliminary discussions between foundry and customer on all details relating to application, properties, composition, etc., should be held so that nothing is left to chance or misinterpretation. When these are completed then design for foundry production can be established. Sample castings are made and submitted to the customer, and upon acceptance, a standard production procedure is set up with the necessary quality controls to insure that the castings will meet the requirements consistently.

Case Study of a Premium Strength Casting by A. J. Carah, Douglas Aircraft Co. Inc., Santa Monica, Calif., described the various problems encountered in converting a machined aluminum extrusion part forming a bracket for holding the fin on a guided missile, to an aluminum casting. The casting about 2 ft long with 1½-in. ribbed channel section and containing two bolting flanges near each end has to withstand severe stresses at the latter. Close co-operation between several foundries and the author's firm led to the development of sand casting procedures to produce castings from No. 220 alloy (90 Al-10 Mg) which met requirements. Castings were made at about 25 per cent of the cost of the machined extrusion. Casting methods later were extended to permanent mold and shell molding processes.

The latest gating study film, **A Study of Fluid Flow of Light Alloys Through Vertical Gating Systems**, was shown at the concluding session. Film is co-sponsored by Frank-

Half-Yard Loader Scoots Around in Boxcar

Compact Tractomotive TL-6 Tracto-Loader is High Producer in Confined Areas



Feeds Conveyor From Inside Boxcar

TL-6 Tracto-Loader moves bulk material from a boxcar to a conveyor set up just outside car door. This 33.7 hp loader has a full half-yard bucket, yet it can scoot around in this confined area, make right-angle turns without jockeying.

Here is a real production booster where work space is limited. The TL-6 is ideal for unloading boxcars, traveling through narrow aisles and doorways, making hairpin turns near columns and posts. Has short, 6½-ft turning radius . . . over-all length only 9 ft, 7 in., width 4 ft, 5 in.

You get big loads fast and you carry them low. Torque converter drive eliminates engine stalling . . . crowding is positive and smooth. Bucket has scooping action — tips back 22° at floor level. Reaches carry position, 50° tip-back, at only 3 ft above floor — means easier maneuvering, greater stability, better visibility.

As for ease of handling, operators say it's the best yet. Forward and reverse are controlled by a single, smooth-working lever — no gear shifting necessary. Reverse is twice as fast as forward — lets you get away from the pile "on the double."

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For bigger, tougher jobs, see the Tractomotive TL-10 Tracto-Loader

— the industrial wheel loader that proved the soundness of Tracto-Loader design. It set new standards in loader performance with a combination of hydraulic torque converter drive and clutch-type transmission. Has 63-brake hp, 1-cu-yd bucket. Various interchangeable attachments.

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Transfer loading to other handling equipment by means of batch weighing and loading hoppers was designed, built and installed by the customer company.

Here is another example in the short-cutting of repetitive, unprofitable materials handling. It demonstrates the substantial benefits of imaginative thinking in solving cost problems in all areas of foundry operation.

Let us send you Bulletins G-700 and SE-108.

NORTHERN CRANES–HOISTS–TRAVELATORS

NORTHERN ENGINEERING WORKS
210 CHENE ST., DETROIT 7, MICH.

ford Arsenal and AFS. Introduction and discussion of the film was by J. G. Kura, Battelle Memorial Institute.

Tests were conducted by pouring water into a Lucite mold and photographing the action with a high-speed camera. The study is aimed primarily at gating procedure for permanent and shell molds. Results show that sprues should have a flared top to serve as a pouring basin. Top of the sprue should have a cross-sectional area twice that at the bottom. There should be a cylindrical well at bottom of the sprue. Area of the runner should be twice that of the sprue. Also the runner should extend past the gate leading into a vertical side runner attached to the casting cavity by a continuous web section. Junctions of riser with gate and gate with runner should be flared.

During the discussion period it was stated that multiple castings should not be gated off a common down sprue. Beneficial results of the recommended gating system are lost by such practice. Additional studies will deal with thermal effects of gating systems.

At the luncheon session, **Castings in Airframe Design,** by George W. Papen, manager, production engineering department, Lockheed Aircraft Corp., Burbank, Calif., was presented in his absence by A. H. Petersen, staff engineer, also of Lockheed. Seventy persons attended the luncheon.

Mr. Papen indicated that the aircraft industry currently is making maximum use of castings, also that additional use in considerable quantity is possible if the industry will exercise controls and improve meth-

"We've all got shields on. How can he tell which one is Miss Hoskins?"

ods and techniques that will reduce and eventually eliminate random defects. The presence of random defects in today's castings is causing the airframe industry to turn away from castings to other forms of fabrication.

Better casting quality through better control of chemical analysis, higher strength through reduction of porosity, smoother surfaces, less warpage, closer tolerances, improved inspection techniques and development of stronger casting alloys were suggested as areas for improvement in the casting industry. He stated that not only does the industry have to learn how to do the same things better but it must learn how to do things that haven't been done before. Continued research, testing and development programs must be installed to keep abreast with modern advances.

Reports on other technical sessions held during the AFS Houston convention will be presented in the August issue.

Metallurgical Graduates Are Fewer in 1955

Metallurgical engineering graduates will be scarcer than ever this year. A total of 492 metallurgical engineering degrees will be given this year in the 49 schools granting such degrees in the U. S. and Canada. Last year the same schools awarded 549 metallurgy degrees. Postgraduate degrees will show a slight increase. These results showed up in a recent survey by the American Society for Metals.

Starting salaries continue to give metallurgy top preference. The high preference for specialists in the field is indicated by an average of over $400 monthly for metallurgical engineers.

Appoints Representatives

Automatic Transportation Co., Chicago 20, has appointed John Gilliam Equipment Co. its representative for the entire state of Texas. The company, which has sales and service facilities in Dallas, Houston, and Ft. Worth, formerly represented Automatic in northern Texas only. Harrison Durett, with offices at 1923 Kohlfahl St., will be in charge of sales in Houston, John Gilliam will supervise Dallas operations, with headquarters at 1307 Dragon St., and J. Hugh Johnson remains in charge at 708 Hemphill St., Ft. Worth.

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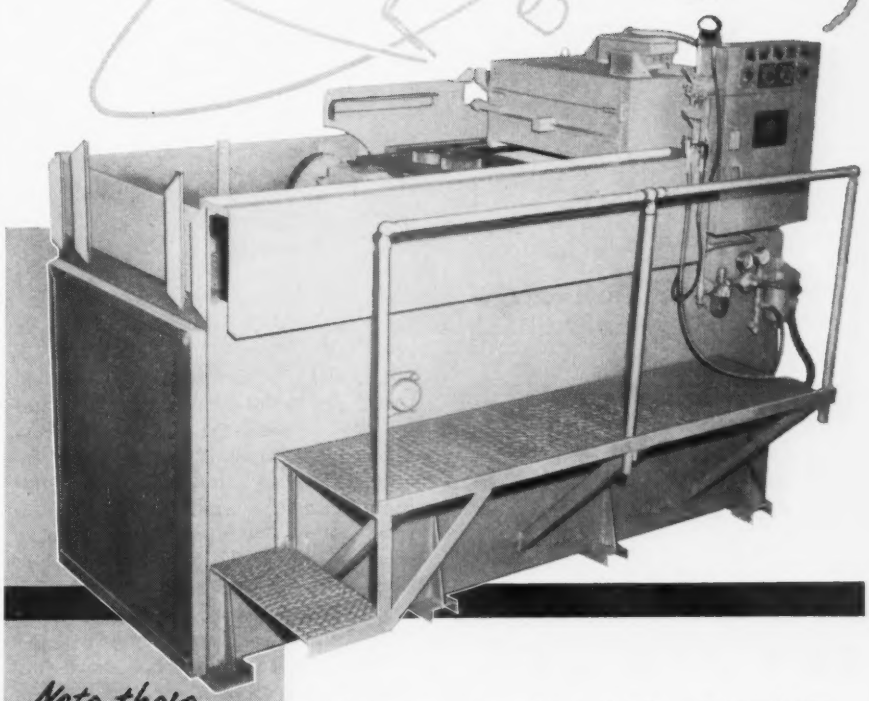

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A complete cycle from heating of pattern to inspection of finished precision shell takes *less than 70 seconds* with this fully automatic machine. Unskilled personnel can easily handle its most simple operation and yet produce 50 or more completely cured shells per hour! Pattern changeover is a matter of minutes. Quickly installed—one electrical and one air connection and machine is ready for operation.

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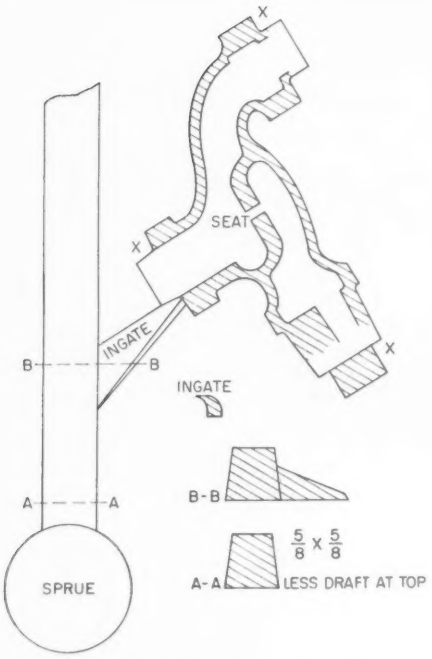
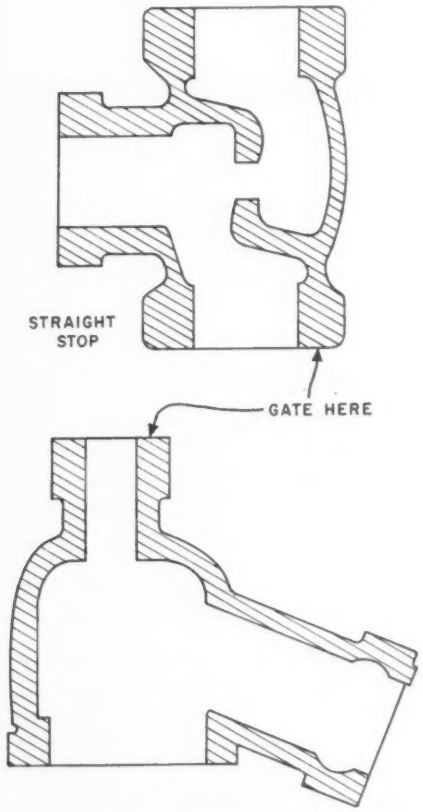
Trouble Shooting

By C. W. AMMEN

Plumbing Ware Is Tricky To Cast



Gates, runner and sprue for a bibcock in the cope. Avoid a gate at X. Gate to feed seat, on low-pressure side of casting



Runner and gates for the two plumbing fixtures shown here are same size and arrangement as those for bibcock faucet

DEAR CHARLIE:

Like many jobbing foundries, we dream of long-run jobs to cover overhead. Jobbing as we do it is a feast and famine proposition. Well, one morning a lad came in who had the answer to our prayers, we thought. His story went like this: Due to the volume of work my firm can place with you and the low selling price of our finished products, we must have castings at low cost, at a low profit to the foundry per pound, but we will give you a continuous profit year in and year out.

The fellow had a whole line of plumbing ware. All the plates are 12 by 18 in., in all sorts of conditions, as are the coreboxes and driers.

The deal looked to us like a good thing, for metal specs were very simple (red or semi-red—76 per cent Cu, 2 per cent Sn, 6-8 per cent Pb, remainder Zn). At first look, this equipment and the amount of castings this fellow wanted spelled easy money, but after sticking some of these jobs in the sand, oh brother! I am shipping you a drum of scrap for examination and remarks. We would like to keep this work but can't unless we can get the hang of it. Some of it is paper thin, and I have my doubts whether anybody could make it. Why is this stuff so tough to make? Help!

Sincerely,
SAM

DEAR SAM:

Be wary of the purchasing agent or customer who arrives with a load of work which he states is a real hot dog deal, running good in another shop, but for several reasons is being pulled out, with you the lucky lad to get the deal.

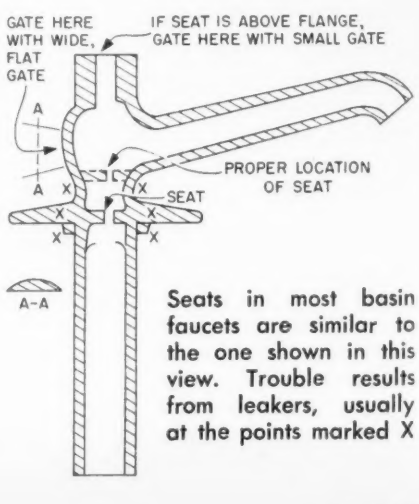
Casting plumbing ware is a tricky business requiring a crew trained in this type of work. It is, for all purposes, a low-cost product requiring close control, fast, clean molding and coremaking, low scrap and constant vigilance and supervision. Experienced jobbing shops have bitten the dust on this work.

Have seen this work figured by cost of metal plus 2 cents a pound for supervision and 2½ cents for overhead, plus 3 cents for labor. This figure is based on a close captive operation, but it can be done. Also have seen it taken on by contract jobbing foundries at 18 cents per pound over metal cost. Now let's cover part of the operation by going over each important factor in making the general line of light plumbing ware.

First, the gating. Most plumbing ware shops do not gate conventionally. They often put both runner and gates in the cope, pouring from one end and slanting the gates directly into each casting or each cavity, as illustrated. Backing the gates up is not practiced by many shops. The gate, where it enters the casting, usually is very small so as to effect a choke and allow for easy removal of the casting.

Pouring must be done by a man who has had considerable experience pouring small, light castings. The sprue must be hit directly in the center, and molds are poured relatively hard. Any bobbling or slacking of the stream or backing off results in what could be construed as cold metal and then sometimes is misinterpreted as a misrun due to cold metal, but in reality is not. The number of molds poured from a ladle varies from job to job. It is possible in the case of, say, a ½ or ¾-in. straight stop, which is relatively a heavy or chunky casting for this class of work, to pour 15 or 20 molds from the same ladle without misrunning many castings because of temperature drop during pouring.

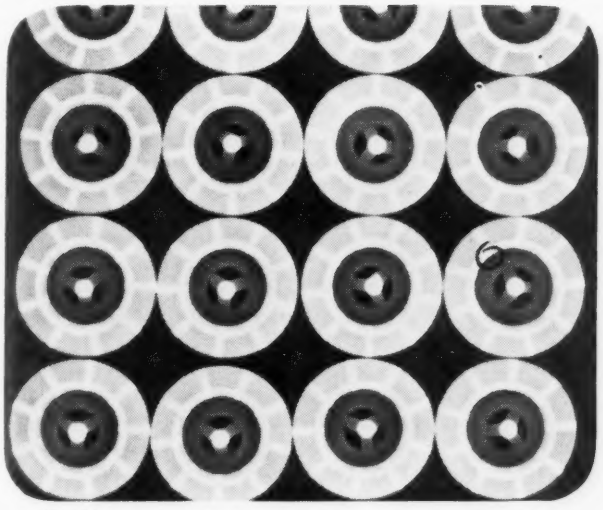
In the case of long thin spouts,



Seats in most basin faucets are similar to the one shown in this view. Trouble results from leakers, usually at the points marked X

SPINS LIKE "BLAZES"—

so Radiography checks each one



Radiograph of oil scavenger rotor in variable displacement pump for aircraft hydraulic systems.

"BLAZES" is not the word—but suggests the maker's shorter expression for the rate at which this rotor spins. Fact is, rpms are so high that the soundness of the casting is important in terms of safety as well as serviceability.

So radiography goes to work and plays its unique part. With no damage to the product, radiography looks inside the part and checks each rotor's structure. Only flawless parts will meet the strict requirements of service.

Proving soundness with x-rays has become common practice with more and more suppliers of quality castings. They know it helps build reputations for delivering only good work.

If you'd like details on how radiography can improve your operations, get in touch with your x-ray dealer—or write us for a free copy of "Radiography as a Foundry Tool."

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Radiography...

another important example of Photography at Work

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like those used on tray fixtures, or on chrome-plated sink swing fixtures, usually only four or five molds are poured with a ladle. Then the ladle is moved to a floor having a heavier section. On very light jobs, do not stop to skim the ladle, and pour no more than seven deep on such jobs. A slack stream, red streaks or a bobble with this class of work results in heavy scrap losses which look like cold metal and misruns. Use a large sprue and pour hard and steadily.

Examination of the castings you sent indicates you are not following this technique. In one case we have a gate with eight castings on the gate, four on each side. The two end castings ran, the two closest to the sprue ran, and we lost two on one side of the gate in the middle, apparently because of a bobble on the part of the man who poured this particular mold. Personally, I do not like to see plumbing ware poured with a ladle with a capacity over 200 to 250 lb unless there is enough heavy work on adjacent floors that the metal in the bottom portion of the ladle can be used efficiently.

Also, the tendency when pouring with a larger ladle is to keep going right on down the line as the metal cools. It takes a particular manual dexterity to do the job right. A properly trained pour-off man in plumbing ware should be given the authority to decide by temperature and the condition of the metal in the ladle where he best can put it. Job changes by molders should be identified on top of the molds so that the pourer will not run from a heavy or semi-heavy job to a light job toward the end of the ladle.

Examination of defects in these castings leads me to believe that worm tracks on the cope surfaces of some of these castings are zinc distillation caused by slow pouring and excessively hot metal. If molds are clean and properly made, the make or break of plumbing ware usually lies in the hands of the man on the ladle.

Pouring Temperatures Vary

Some of the temperatures commonly used are as follows: Waste tees, traps, J-bends and spouts, 2275° F in the ladle; bibbs, bodies, eccentrics, garden valve bodies, coupling nuts, gas cocks and keys, 2200° F in the ladle; stems, chunky parts and heavy coupling nuts, 2125° F in the ladle. Some spouts, however, like the laundry fixture you sent, must be poured over 2275° F.

Ninety per cent of the defects in these castings I would attribute to metal pouring and handling. About 5 per cent appear due to slovenly or dirty molding, and the remaining 5 per cent apparently are due to bad core practice.

Most plumbing ware cores are made with blow-boxes and driers and a straight oil-sand mix, with the ratio from as low as 35 parts sand to 1 part oil and as high as 60 to 65 parts sand to 1 part oil. The following mix has worked well in a foundry with which I am acquainted: 50 qt of Delmonte number 60 sand, 10 qt of Nevada 120 sharp silica, 1 qt corn flour, a small amount of ferric oxide, 1½ qt of linseed oil or a good commercial oil and a small amount of water to temper. This is a blow mix. As a bench sand for stand-up cores and the like, use 50 qt of number 60 Delmonte, 20 qt of Nevada 120, 3 qt lignin sulphite, 3 qt of western bentonite, 1 qt cereal, 2½ qt water and 2½ qt of oil.

Any good mix, if properly baked out, will do a good job, but avoid mixes containing too fine a sand. Cores should be very open to prevent blows due to the absence of vents in the cores. On small bibbs and any type of valve where a small sec-

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tion goes through the seat of the valve, some defects are caused by fine fins of sand not being cleaned from around the core between the bonnet side and the bottom side, leaving little slits through the seat which will not machine out.

Some of the castings have blown around and under the seat; this defect is caused by wet daubing of the cores, a wet core coat or green cores. In some of the swing spout fixtures, a thin metal wall across the opening results from cracked cores or cores that were apparently bad to start with. Make sure that you have enough driers for each job so as to get enough cores per day to run your molder as continuously as possible on one particular job. Many job changes per day will, in most cases, cut production badly. Be on the constant lookout in the coreroom for excessive losses in the cores at the coremaking stations, at the ovens and at the cleaning station—also in the handling of the cores by core handlers and molders.

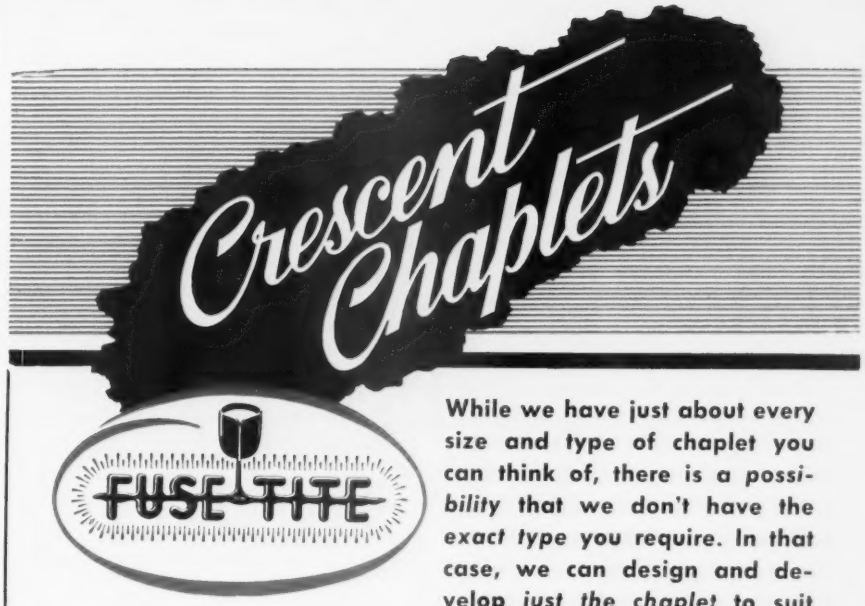
Cores Must Be Good

If cores are delivered to the molder in an unsuitable condition, he usually will use them anyway, particularly on a piece-rated job. The coreroom should be made responsible for delivering clean, usable cores to molders, with a minimum amount of bad cores per box. Checking on core production takes close supervision. Standards should be set up and personnel trained to adhere to them.

Now to the boy who makes the molds. As stated earlier, the molder must have sufficient good cores to work with as continuously as possible on the same job. He must be held to a minimum amount of downtime and off-task work. He should have sufficient flask equipment, sand and cores at all times to prevent him from losing molding time.

Most molds can be made in any number of good brass sands. The tendency lately has been to go into synthetic sands, which can be controlled closely. Molds should be firm and clean, made with tight flasks with good pins and bushings. It is a good policy, as more and more shops are doing, to assign a man to the molding line to examine molds from time to time. Often defects are overlooked by a molder in his haste to put up as many molds per day as possible, and on some plumbing jobs the cores are so much alike that it's possible to set the wrong ones. A good inspector on the molding line can save many times his wages by stopping scrap.

It goes without saying that unless the sand is in the proper condition when it reaches the molder, all is



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lost. Too often a man is put in charge of the sand system who does not have the necessary know-how or interest in the company to give a good, continuous performance. Some foundries install a sand lab and then turn the whole thing over to a $1.50-per-hour laborer who has the power to make or break them.

In this class of work, pour-off is usually fairly continuous, without much mold storage. It is a good policy to hook out a gate every 10 or 20 molds and run it through the cleaning machine, gates, castings and all, for examination. This step sometimes will prevent a guy from making a whole doggoned day of scrap.

Let's turn to the melting of the metal and the handling of it, from furnace to molds. In most cases, I would say, the biggest portion of metal melted today in plumbing ware shops is melted in gas or oil-fired crucible furnaces, either pit or tilting type. General procedure is to melt slightly oxidizing. Again, the position should not be trusted to low-paid men of questionable ability. Large quantities of plumbing castings are chrome-plated, often in the last operation, after all the machining has been completed. It usually is at this time that pin porosity, a big headache to most plumbing ware manufacturers, shows itself. Chrome-plating seems to accentuate the condition. Success demands properly degassed metal poured at the proper temperature in good molds.

Some shops are using pretty potent deoxidizers. In chrome work, shrinkage porosity as well as gas porosity is a cause of much scrap. Basin cocks like the one illustrated are common offenders along these lines. Ninety per cent of them are plated and must have a flawless appearance.

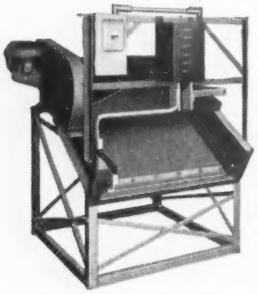
The position of the seat of this valve should be slightly above or below the flange to reduce the natural heavy section at that point. If this casting were gated properly to take care of shrinkage porosity at the point shown in the diagram, you would be unable to remove the gate from the castings economically. In most cases of this type a small, residual amount of gas in the metal is almost a necessity. Leakers can be caused in plumbing ware by excessive deoxidation at the ladle or by metal that is too free from gas and causes shrinkage porosity. Leakers around the neck, directly above the flange, usually are caused by poor design.

Rapid Shakeout Causes Leaks

Leakers in chunky items can be caused by too rapid a shakeout. Examination of some of your castings shows a fine, dark, checkered line. These usually don't show until after machining or cleaning. This defect generally causes leakers, and the usual cause is exposure of the castings to the air or to water spray before the metal has had time to solidify adequately.

A defect which does not affect pressure tightness occurs on the tops of the castings, particularly in those that are polished and plated. It consists of small, clean, yellow holes, usually in a straight line. These ordinarily are caused by small particles of oxidized metal entrapped in metal entering the mold and in most instances can be eliminated by the use of clean ladles. A ladle full of metal for the first time leaves a slag line at the top which should not be covered by the next load of metal. If it is, some of the oxides may loosen and float into the metal.

The evenly distributed sponge-type of defect usually is due to oversoaked metal. Improper furnace combustion produces a porous casting with orange, red, brown, golden-yellow holes, usually clean and free from



Economical Reclaiming of Foundry Sand

Reclaiming of difficult and damp foundry sand is unusually economical and efficient with the electrically heated Leahy ® Screen.

The exceptional performance of the Leahy is attributed to the double barreled advantage of differential vibration and FlexElex heating of the screen jacket. The differential vibration snaps wedging particles loose while FlexElex keeps the mesh dry and wide open for full capacity screening at all times, hour after hour, day after day.

In addition, the new Model E Leahy assures lower power consumption and other operating advantages.

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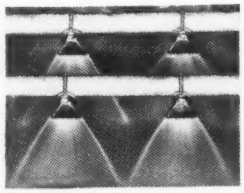

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sand. These castings usually leak. Another problem is the undried-ladle type of porosity, which creates fine, orange-yellow holes. When a crystalline structure shows upon fracture, it is caused by wet ladles.

Defects in some of the castings you sent are the result of sand. Because these plates commonly are crowded in an effort to get as many castings per mold as possible, sand must be properly tempered and bonded and the mold exceptionally clean after the cores have been set. Care should be taken not to allow any sand to go down the sprue, the sprue must be choked properly and the metal should not be poured hot enough to wash sand into the castings.

To reduce oxidation of metal in the furnace and in the ladle and to prevent excessive volatization and oxidation of zinc, some operators cover the metal with a slag or cover consisting of a mixture of 100 lb of dehydrated borax, 77 lb of whiting and 50 lb of sodium sulphate. Another cover consists of a borax and glass mixture. Some crucibles, however, are attacked rapidly by these high-acid slags. I, for one, prefer no cover for this type of work, although should the combustion sneak over to the slightly reducing side, the slag cover usually prevents too much hydrogen absorption.

The rest of the operation should be given as much care as the departments already discussed. As stated earlier, this work is exceedingly competitive, and the finished item is exceedingly cheap. However, don't let it throw you. The crux of the whole thing in making plumbing ware is close, tight control of simple, sound, basic, fundamental practice, leaving nothing whatsoever to the judgment of the operators. Don't give anyone any latitude or allow changes in the operation without your O.K. A well meaning employee may cause you a lot of grief and scrap merely because he does not understand subsequent operations or the nature of the particular animal he is fighting.

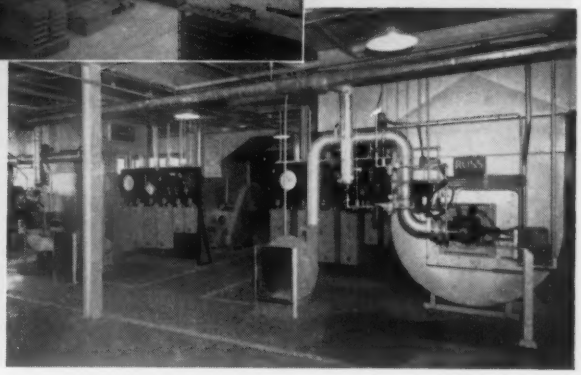
Sincerely,
CHARLIE

Timken Given Society Award

The American Society for Materials Handling at its annual awards meeting in Cleveland recently named the Timken Roller Bearing Co. the recipient of a citation for the best installation of a materials handling system in production in northeastern Ohio. The annual award is made on the basis of originality and efficiency. Last year's winner was the Cleveland plant of Ford Motor Co.

Automation
comes to CORE BAKING
with modern ROSS Ovens

View from entering end of ROSS oven showing catwalk and conveyor drive, with heater and air tempering coils housed above oven.



ROSS heating equipment showing burner end of heater, recirculating ductwork, filters, etc. Note compact grouping of controls and starting equipment.

ROSS Overhead Nozzle System
Insures Uniform Air Distribution

For one of America's leading automobile manufacturers, core baking has been really mechanized to effect sizable savings in material and operating costs. The two ROSS Horizontal Core Bake Ovens, each complete with heating and cooling equipment, are designed with conveying apparatus both inside and outside of the oven.

Each oven consists of 4 baking passes and 2 cooling passes in a separate insulated enclosure. Rows of specially designed and directed nozzles insure even distribution of treated air.

ROSS Conveyorized Core Baking Systems can prove a paying investment for large or small foundries. Write us for detailed information.

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Around the Country

NEWS REPORTS FROM

Pittsburgh . . . New York . . . Los Angeles . . . Philadelphia

New York—Business in gray iron castings locally has been lagging behind that in some of the other eastern districts, and with the summer vacation season near there is little chance of local shops picking up lost ground. Many foundries will be down for mass vacations during the July 4 week, and some will be closed for longer periods and at other times during the summer. Thus the outlook is for a rather sluggish period during July and August.

Gray iron shops are averaging little better than four days a week. June operations for several shops are off from those of May. Plants showing any particular activity are engaged in construction needs of one description or another.

Brass and bronze shops turning out components for meters, valves and plumbing fixtures report a continued brisk demand, which reflects continued activity in building construction. Most shipyard foundries are fairly busy and more nonferrous metal is going into pumps than a month ago. Aircraft requirements still lead in the aluminum casting field.

Bendix Aviation Corp., Teterboro, N. J., is placing contracts for a new diecasting shop.

Los Angeles—With casting requirements higher than at any time this year, most foundrymen are increasingly optimistic regarding future prospects. Almost all foundries report activity better than a month ago and ahead of expectations. Thus far no sign of an impending summer slump is noted, and many shops say their second quarter sales were 10 per cent better than the like period last year.

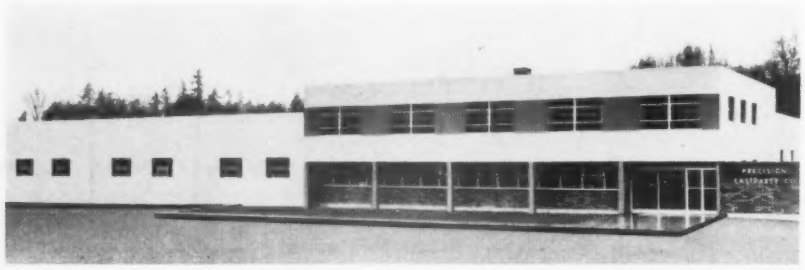
Foundry melting rates continue to increase. Most steel foundries are operating close to 100 per cent of capacity, and some nonferrous foundries are also near full capacity. Although no overtime is reported, five-day work schedules are standard throughout the district.

Inquiries from a wide range of casting users appear to assure a continued high level of activity. Most foundrymen say about one-third of all inquiries result in sales.

Backlogs of both ferrous and nonferrous shops continue to lengthen, stretching beyond six weeks in some cases. This compares with backlogs of about four weeks at the start of the year.

Supplies of foundry scrap remain plentiful, although dealers in this district anticipate increased cast scrap prices in the near future. Most foundries are paying $42 for No. 1 cupola cast. Foundries generally have scrap inventories sufficient to support about three month's production.

West Coast aircraft plants are busy, despite Air Force Secretary Talbott's statement that production should be moved inland from the coast. Foundrymen note that castings for aircraft use are still being ordered with frequency.



DOUBLES CAPACITY: Precision Castparts Co., Portland, Oreg., has moved into a new, 48,000-sq-ft plant at 5001 S. E. Johnson Creek Blvd. which more than doubles the operating capacity of the company's former facilities. The new structure will include tool and die making equipment, a metallurgical laboratory and a complete inspection department

Pittsburgh— Merchant pig iron shipments climbed rapidly in Pittsburgh in the late second quarter, as foundries built up stocks against possibility of a strike cutting off supplies. Another reason for stockpiling was to buy pig iron before a possible increase in price. Foundrymen remember that pig iron price was not raised last year, although producers' costs increased. This year producers consider a price increase inevitable if steelworkers win a substantial wage hike.

Foundrymen enjoy a continuing increase in sales, although the customary summer slowdown may begin in July. Foundries supplying automakers are very busy. Others say customers are still acutely price-conscious, looking continually for lowest possible costs.

Railroads and coal mines remain in the doldrums locally. With these two industries buying few castings, an important segment of foundry activity is slack here.

Over-all sales are well above year-ago totals, and foundrymen are optimistic about the balance of 1955. Steel production has held near top capacity longer than was expected. Result is strong sales of equipment to steel mills. Outlook for third quarter is very good, barring any work stoppages at mills.

Central Michigan— Automotive foundries in the area still are at peak production. Little slacking off is seen in the immediate future. As a matter of fact, expansion and modernization programs at some of the shops indicate anticipation of still greater production.

Jobbing shops not engaged in automotive work apparently are not booming. Business activity for them is somewhat better than it was the

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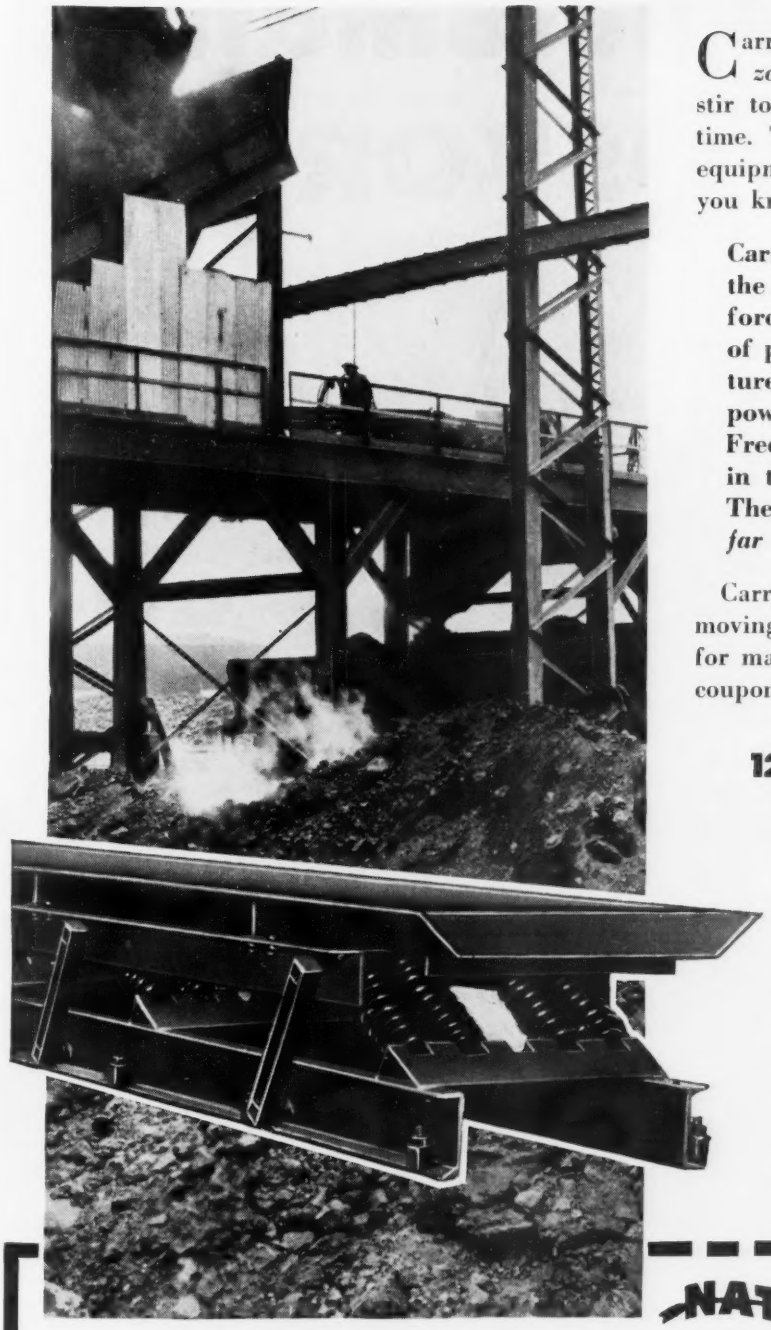

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Carrier Natural-Frequency Conveyors substitute the natural resonant action of springs for brute force — thus UTILIZING the tremendous force of periodic vibration, which no other manufacturer had ever learned to handle! Most of the power needed to operate Carrier Natural-Frequency Conveyors is repeatedly stored up in the springs, and returned on every stroke. The result — *much less power required . . . far less maintenance . . . far less down-time!*

Carrier Natural-Frequency Conveyors are now moving (and processing) hard-to-handle materials for many of America's biggest industrials. Mail the coupon, *today*, for all the facts.

12,300 Foot-Tons of Hot Slag Per Hour—With 7½ H.P.!

Open-hearth slag is about as hot and abrasive as anything you can think of. It chews up conventional conveyors in "no time at all".

Moving up to 300 tons per hour of hot slag (800° to 1200°F) is routine for the 41-ft. Carrier Natural-Frequency Conveyor shown at left. There's practically no pan wear — no spillage — no maintenance!

This is just one of many unusual applications. Tell us your problem and let us see what we can work out for you. No solution, no obligation. Write!

CHECK THESE CARRIER *ADVANTAGES!*

HIGH CONVEYING SPEED
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(Up to 200 tons per hour)

LESS POWER REQUIRED
(About one-third as much as "competitive" equipment)

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(Less power + good design = trouble-free performance)

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WIDTHS FROM 6" TO 48"
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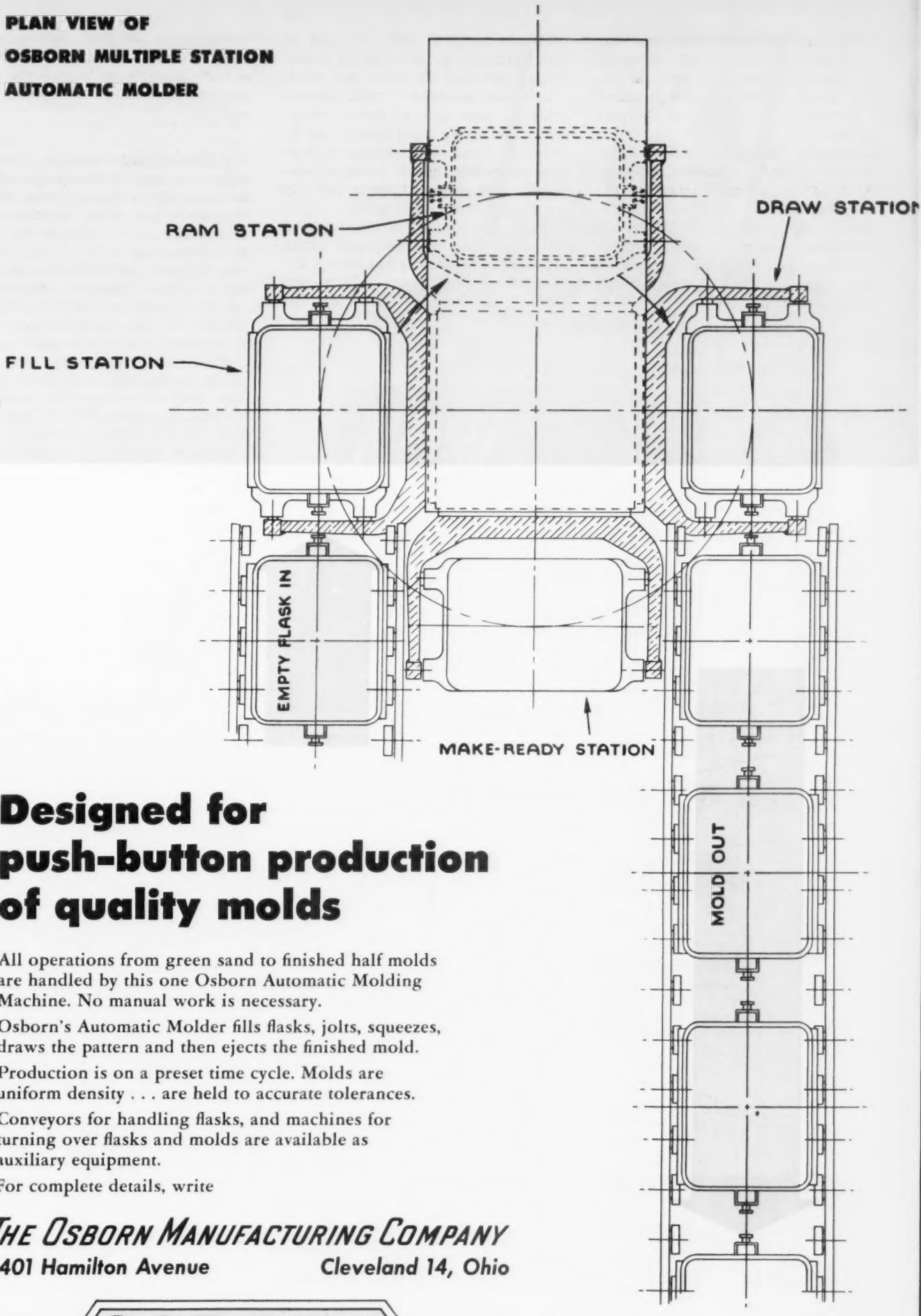

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Osborn's Automatic Molder fills flasks, jolts, squeezes, draws the pattern and then ejects the finished mold.

Production is on a preset time cycle. Molds are uniform density . . . are held to accurate tolerances.

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latter part of last year and the trend is up. This picture is voiced by equipment suppliers who, in the past month or two, have experienced a quickening of interest on the part of buyers.

Saginaw Malleable Iron Plant, Central Foundry Division, General Motors Corp., is an outstanding example of a clean, well-kept foundry. It is a highly mechanized operation, producing malleable and pearlitic malleable parts for the automotive and other industries. Although pouring is continuous, the air is clear and visibility is good from one end of the plant to the other at all times. Floors are free of clutter and sand. Aisles are ample and well defined. They are kept clean by power sweepers. Also many hand brooms are in evidence. Whenever production lines stop momentarily for some adjustment, workers grab brooms and tidy up around their work area.

Such conditions are not achieved overnight. Housekeeping and safety at Saginaw Malleable has been a byword for several years. Continuing worker education is a must. But the feeling here is that management wants a neat, clean, safe foundry so badly that the same desire is carried over and instilled in production workers.

Philadelphia—With the vacation season at hand, foundry operations are due for a slump. Most shops close down for a week for mass vacations, and many of them will be down during the first week of July. Others will be down for two weeks; and the effects of these vacation suspensions, combined with hot weather, will be reflected in one measure or another throughout July and August.

Until now, however, the trend over recent months has been upward. In June gray iron shops have been averaging five days a week, although with slightly reduced forces. For instance, 16 representative foundries in the Philadelphia-Reading area have been operating five days a week, with another, in Reading, operating six days, or 120 per cent of normal.

Apart from those specializing in pipe and other construction requirements, gray iron shops have relied on a diversified character of work to keep them busy. At no time, however, have these foundries been able to build up much in the way of backlogs—certainly not more than three or four weeks on an average, if that.

Steel foundries have been moderately busy, although there appears to be more activity among the producers of light and medium size castings than of the heavier castings. Most steel foundries are operating close to five days a week, with promises averaging around 30 days. Malleable business is none too active. Most shops, however, are able to maintain five-day-week operations. Business with the brass and bronze shops is spotty.

"How do they expect you to get clean in a bathtub like this?"

Armour Research Foundation Sets Up New Department

A new department called engineering economics research has been established at Armour Research Foundation of Illinois Institute of Technology, Chicago. It combines the efforts of scientists, engineers and economists in the solution of a variety of problems.

As it is to be developed at the foundation, engineering economics has a two-fold definition: 1. Study and evaluation of the economics of engineering developments. 2. Study and evaluation of economic problems through engineering methods. Typical of the types of projects the foundation expects to undertake are market analyses of technical equipment or services, new applications for existing materials or products, technical and economic evaluation of products, utilization of waste materials and area development studies.

Booklet Covers Effects of High Temperature Corrosion

Information on high temperature corrosion behavior of 31 materials ranging from cast iron to lead, including some nonmetallics, has been tabulated and published by the National Association of Corrosion Engineers, 1601 M & M Bldg., Houston. The report, "High Temperature Corrosion Data," was compiled by Technical Unit Committee T-5B on High Temperature Corrosion.

Data cover a number of stainless steels and high alloys subjected to temperatures over 400° F. Corrosion rates are indicated as low, moderate or high versus specific temperatures. Copies are available from the association at 50 cents each.

Book Review

Aluminum Paint and Powder, by Junius D. Edwards and Robert I. Wray, cloth, 219 pages, 6 x 9 in., published by Reinhold Publishing Corp., 430 Park Ave., New York 22. Price $4.50.

Manufacture, properties and testing of aluminum powder are described with emphasis on processes involved, color brilliance, leafing, density, grading and handling. Full chapters discuss the composition, properties and uses of aluminum paint in a wide variety of industrial and other applications. Book is intended for paint technologists, coatings engineers, chemists and metallurgists and others who determine the suitability of aluminum paint and powder for specific applications.

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1. Reduces ladle pre-heating time as much as 75%.
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THERMAL ladle heating installations are available complete with ladle covers or ready for mounting to your present cover. All necessary valves, blower, pump, etc., are supplied for immediate application.

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ACTIVITIES
of Foundry Groups

Pittsburgh: A talk covering research projects on shell molding, shell blowing, chemical inoculation of irons, hot tearing in steel castings and titanium casting was presented at the May 16 meeting of the Pittsburgh Foundrymen's Association held at the Webster Hall Hotel. Speaker was Lyle L. Clark, supervisor of foundry research, Armour Research Foundation, Chicago.

He reported that research on effect of fluorides in gray iron has been done at four foundries with varied practices. Results showed a 10 to 15 per cent gain in tensile strength as a result of inoculating with fluorides. Mr. Clark believes with better inoculating techniques this could be improved. Titanium casting has its problems, but the metal offers advantages in wear resistance. Mr. Clark concluded by showing data obtained on hot tearing.

Newly elected association officers are H. C. Stirling, Blaw-Knox Co., president; Earl J. Biller, Vulcan Mold & Iron Co., vice president; and E. P. Buchanan, Pittsburgh Coke & Chemical Co., re-elected secretary-treasurer. —*Robert M. Love*

St. Louis: Thirty students and faculty members from the Missouri School of Mines journeyed from Rolla, Mo., to attend the Apr. 14 meeting of the AFS chapter. Dean Curtis L. Wilson thanked chapter members for their support of the school and invited their attendance at the Missouri Valley Regional Conference scheduled for Sept. 29.

Dr. A. W. Schlechten, chairman, metallurgy department, and Dr. D. S. Eppelsheimer, professor of metallurgical engineering, talked briefly on what the school is trying to do in preparing young men for the metal industries. D. S. Gould showed color slides of the foundry operation at Rolla.

Charles A. Gray, training supervisor, Emerson Electric Co., St. Louis, in a talk, "Training for Industry," described his company's means of selection, placement and indoctrination of young engineers. Session concluded with the ACF Industries film, "The Male Fist," illustrating all phases of that company's operations and facilities.

Annual dinner-dance was held Apr. 16 at Norwood Hills Country Club with 250 members and guests present.

The final meeting of the 1954-55 season for the AFS chapter was held in St. Louis on May 12. Eugene Boll, Central Pattern Co., was introduced as the first-place winner in national competition in the wood patternmaking division.

Guest speaker was L. G. Probst, district manager, National Engineering Co., whose subject, "Reducing Costs by Practical Mechanization," was accompanied by slides of several existing installations. Speaker said that the only reason for mechanization is to reduce costs and is defined as providing methods of servicing the molder so as to make the greatest number of molds at the lowest cost.

Mr. Probst suggested it is important to make a careful study of existing operations before starting to mechanize and then to start in a small way at the proper place. Advantages offered were improved molding material, reduced manpower and lower scrap. Pitfalls to be encountered are difficulty in selling supervision and workers, trying to start too fast and lack of flexibility.

The annual chapter picnic will be held Aug. 6.—*Jack Bodine Jr., Bodine Pattern & Foundry Co.*

NEWLY ELECTED Officers for 1955-56 of the St. Louis Chapter of the American Foundrymen's Society are shown above. Left to right are Paul E. Retzlaff, Nordberg Mfg. Co., secretary; George L. Mitsch, A. C. F. Industries, vice chairman; John O'Meara, Banner Iron Works, chairman, and Robert C. Kane, Midvale Mining & Mfg. Co., treasurer. Election was held at the May 18 meeting

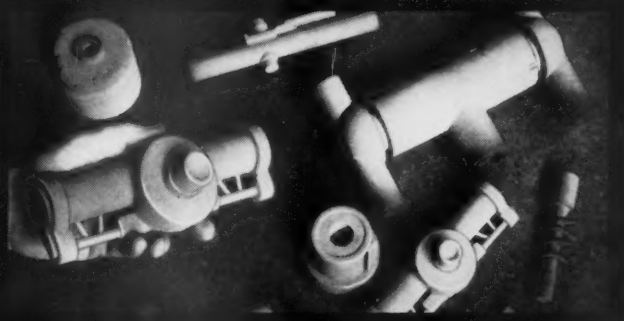
Western Michigan: Over 1000 members of the AFS chapter met Apr. 4 at Cottage Inn, Muskegon Heights, Mich., to hear Lyle L. Clark, supervisor, foundry research, Armour Research Foundation, Illinois Institute of Technology, discuss a variety of subjects of interest to foundrymen. John A. VanHaver, Sealed Power Corp., chapter chairman, presided and Horace Deane, Campbell, Wyant & Cannon Foundry Co., was technical chairman.

Mr. Clark presented a wealth of material that included information on use of vibration as a useful tool in casting, use of fluorides as chemical inoculants in gray iron, casting titanium, factors affecting the quality of chip briquets for melting and some tips on shell mold equipment.—*W. W. Hicks, Sealed Power Corp.*

Oregon: George E. Miller, Federal Foundry Supply Co., Cleveland, addressed the AFS chapter at the Columbia Athletic Club, Portland, Oreg., on Apr. 20. His subject, "Sand Ramming by Blowing."

Mr. Miller used easel-mounted posters to describe how blowing machines work and what takes place when cores and molds are blown. He gave tips on proper venting of coreboxes, placement of blow holes and opera-

pin cores* or complicated cores**



MAXIMUM PRODUCTION!
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*37,440 pin cores per shift!

If you need pin cores . . . lots of 'em . . . and every one perfect . . . this is the machine for you.

Tolerances held to within .005 of an inch and produced at less than $1 for 600 . . . all costs included.

Operated by unskilled labor the Chicopee Core Chief is the most productive and the least expensive shell core blower in the country.

**1/3 the cost of old methods

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You get smooth precise inside finishes . . . better collapsibility for speedier shakeout.

By eliminating core dryers and ovens . . . using unskilled labor the Core Chief produces better cores . . . at speeds hitherto impossible . . . and at savings of 50% or more.

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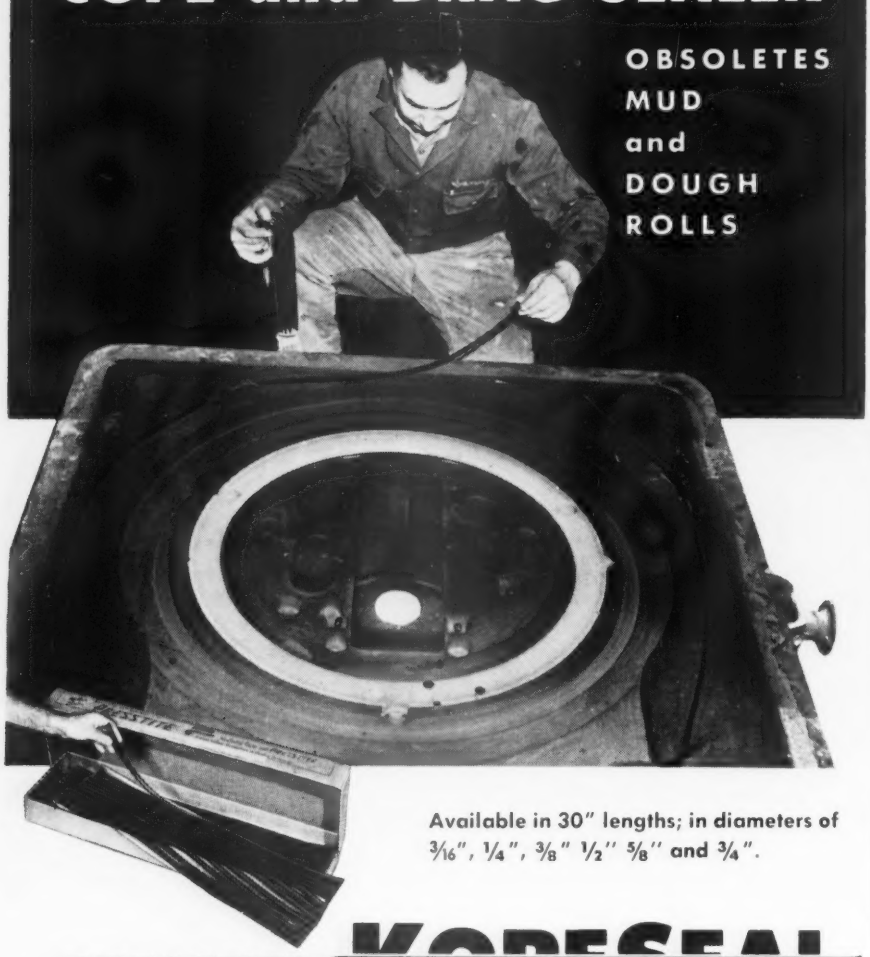

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tion of various types of blowing equipment. Slides were shown picturing both core and mold blowing machines in use.—*Bill Walkins, Electric Steel Foundry Co.*

Wisconsin: Sixteenth annual Old Timers and Apprentices meeting was held May 13 at Hotel Schroeder, Milwaukee. 140 old-timers qualify with 50 years work in the industry. This year 14 new members were added, and each received a plaque bearing his engraved name. Also present were 69 apprentices.

The following were winners of the chapter's apprentice contest: Wood patternmaking—first place, tie, Ralph Heckel and Robert Amann, Nordberg Mfg. Co.; second place, Curtis Hollweck, Nordberg Mfg. Co.; third place, Ronald Raether, Bucyrus-Erie Co. Metal patternmaking—first, Jayson C. Yatzek, Waukesha Foundry; second, Salvatore Cincotta, Allis-Chalmers Mfg. Co.; third, John Taylor, J. I. Case Co. Steel molding—first, Richard T. Bernier, Maynard Electric Steel Co. Gray iron molding—first, Raymond Martens, Brillion Iron Works Inc.; second, LeRoy Moczynski, Nordberg Mfg. Co.; third, Joseph Scardino, Vilter Mfg. Co. Nonferrous molding—first, Harold Jost, Eck Foundries; second, Donald Tetzlaff, Allis-Chalmers Mfg. Co.; third, Oswald Keller, Nordberg Mfg. Co.

Officers for next year were introduced: President, Charles Fuerst, Falk Corp., Milwaukee; vice president, Prof. George Barker, University of Wisconsin, Madison; secretary, Norman N. Amrhein, Federal Malleable Co., Milwaukee; treasurer, re-elected, Bradley Booth, Carpenter Bros., Milwaukee. Directors elected for three years were Robert Osborne, Lakeside Malleable Castings Co., Racine, retiring president; Thomas H. Tanner, Zenith Foundry Co.; Richard Heine, University of Wisconsin; and James A. Arter, Ampco Metal Inc., Milwaukee.—*John E. Hubel*

Cleveland Nonferrous: James Goldie, foundry instructor, Cleveland Trade School, outlined the foundry training program for apprentices and employees offered by that school at the Apr. 28 meeting. A two-year course covers all phases of foundry work and includes blueprint reading, sand preparation, patternmaking, in addition to molding and pouring of castings.

D. C. Courtwright, principal of the school, described plans for the new $2.5 million school building, soon to be constructed. The latest facilities for 33 shops and related classrooms as well as a gymnasium, auditorium, library, and visual aid rooms are

included. Foundry will contain 6000 sq ft and will have a cupola charging floor, pattern storage room, sand testing room, eight bench stations, nonferrous melting equipment, coreroom and cleaning room.

The chapter's annual golf outing will be June 24.—*Walter O. Larson Jr., Grafton Foundry Co.*

Washington: The AFS chapter met May 19 at the Block House, between Seattle and Tacoma, to hear a talk on "Steel Casting Design" by Martin J. O'Brien Jr., general manager, Atlas Foundry & Machine Co. Thirty-eight members and guests attended.

Second place in the steel division and third place in the wood pattern division of the national apprentice contest were won by apprentices of the chapter. Albert Meier, Atlas Machine & Foundry, and Dave Sullivan, Pacific Car & Foundry Co., were the award winners, respectively

Mr. O'Brien stated that the first step in improving casting design is to educate design engineers with castings and the problems of the casting industry. Engineers should understand basic foundry problems so they can make a sound design compatible with production methods and equipment. A basic rule for quality castings is to design them to give the highest strength required in minimum sections, keep uniform metal section where possible and apply basic steel casting rules where sections change so casting can be properly risered.—*William K. Gibb, Atlas Foundry & Machine Co.*

Philadelphia: Charles Mooney, superintendent, Olney Foundry Division, Link-Belt Co., was featured at the AFS chapter's April meeting at the Engineers Club. About 100 members attended the dinner and technical meeting. George Gough, assistant general manager, Rolle Mfg. Co., was technical chairman.

Mr. Mooney chose as his subject, "Guide to Core Mixtures," and elaborated on the properties desired in the basic materials which go into the making of cores—sand, cereal, water and oil. Proper core performance will be obtained only after careful analysis and determination of what is required from the core and then adhering to established formulas learned from experience in obtaining a core mixture that will meet those requirements.

Recently elected new officers for 1955-56 were installed at the May meeting of Philadelphia Chapter of the AFS. New chairman is Charles W. Mooney Jr., Olney Foundry, Link-

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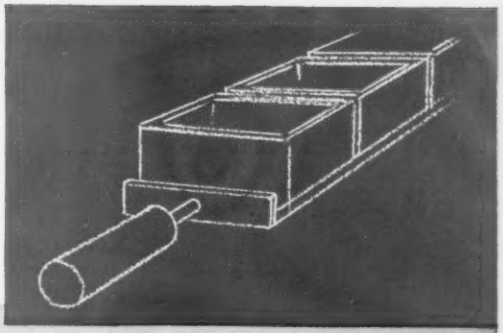

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Belt Co., Philadelphia; vice chairman, Walter Giele, Walter Giele Co., Lebanon, Pa.; and William B. Coleman, W. B. Coleman Co., Philadelphia, continues as secretary-treasurer with Herman E. Mandel, Pennsylvania Foundry Supply & Sand Co., Philadelphia, as assistant secretary-treasurer.

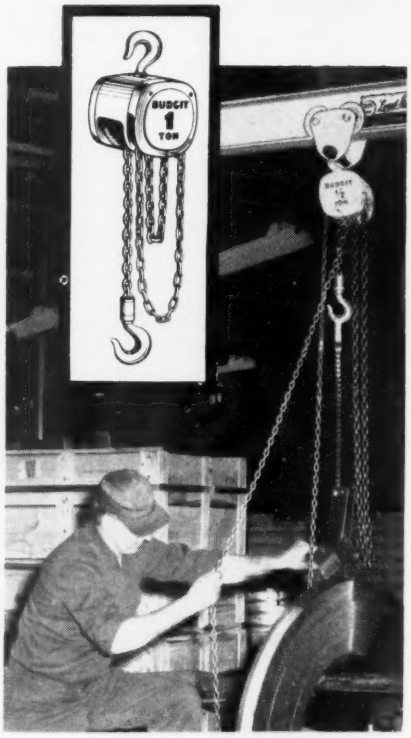
Joseph J. Schil, apprentice at Dodge Steel Co., Philadelphia, who won third place in the national steel molding apprentice contest was presented an award. Honored guest present at the meeting was H. Gordon Robertson, a regional director from AFS.

Speaker, Raymond C. Huntoon, president, Pressure Match Plate Co. Inc., Philadelphia, gave an interesting talk and showed a film on manufacture of pressure matchplates and the production of patterns by the plaster process. Earl Eastburn, Philadelphia Brass & Bronze Co., was technical chairman. — *C. R. Sweeney, Atlantic Steel Castings Co.*

Twin City: Thirty-six old timers were honored at the May 10 meeting of Twin City Chapter of the AFS. Each has more than 45 years of service to the industry. To mark the occasion, they received cast bronze ash trays donated by John R. Roth, Progress Pattern & Foundry Co., St. Paul. E. S. Reiland, General Pattern Co., St. Paul, prepared the pattern, and finishing touches were added by Archer-Daniels-Midland Co. Research Laboratories, Minneapolis.

"Our Most Valuable Asset," dealing with employees' personal contact with the public and its influence on the reputation of the company was discussed by Charles Arps, public relations division, Allis-Chalmers Mfg. Co., Milwaukee. He pointed out that good public relations has its origin with the company and hinges on management's policies toward the employees and business ethics, the public relations organization within the company and the willingness of employees to co-operate with management. Mr. Arps said in conclusion that it is the intention of public relations efforts to convince the public that business is human and has a heart.—*R. J. Mulligan, Archer-Daniels-Midland Co.*

Reading: "Shell Molding and Shell Molding Castings" were discussed by William S. Thomas, Emmaus Foundry & Machine Co., Emmaus, Pa., at the May 18 meeting of the Reading Foundrymen's Association. Present were 100 members and guests. Officers elected for the coming year are Paul K. Reiniger, Textile Machine Works, president; J. W. Swen-



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gel, American Chain & Cable Co., vice president; Paul C. Holland, Beryllium Corp., treasurer; and W. I. Cassidy was re-elected secretary. Members of the executive committee include James Woodward, retiring president, and Paul B. Harnar, Daniel Heckman, George C. Kissel, Robert M. Schumo and James H. Stewart.—*W. I. Cassidy*

Southern California: Meeting May 13 at Rodger Young Auditorium, Los Angeles, 100 members of Southern California Chapter of the AFS learned that the following were elected officers to serve next year: President, William Baud, Mechanical Foundries Division, Food Machinery Corp.; vice president, William Mitchell, Utility Steel Foundry; secretary, Frank Warga, AiResearch Mfg. Co.; treasurer, Otto H. Rosentreter, Otto H. Rosentreter Co.

Edward Haines, H. Kramer & Co., reported that a sound foundation has been laid for an aggressive educational program in the area. Principal speaker was William D. Emmett, general superintendent, Los Angeles Steel Casting Co., and a past president of the chapter. He discussed "Control of Used Sand by pH," and showed a number of slides.—*W. G. Stenberg, U. S. Electrical Motors Inc.*

Saginaw Valley: Three group sessions were arranged for the April 7 meeting of Saginaw Valley Chapter of the AFS held at Frankenmuth, Mich., which 130 members attended.

Donald E. Matthieu, Kerchner, Marshall & Co., detailed the methods of coke selection, preparation of a cupola bed and methods of lighting the bed for those interested in gray iron practice. He recommended coke of a size one-eighth the diameter of the cupola and cautioned that proper preparation and burning-in are important enough even to delay operations. Carl Tobias, General Motors Institute, was technical chairman.

At the steel group meeting Warren D. Lewis, Great Lakes Foundry Sand Co., led an informal discussion on steel molding and core sands. Samuel S. Fair, Valley Steel Casting Co., presided.

At the light metals session, Arthur W. F. Green, Allison Division, General Motors Corp., discussed "Use of Light Metal Castings in Aircraft Applications." He indicated that each pound of weight saved increased the payload or the range of the aircraft. With the higher operating temperatures of present-day and prototype engines, thorium-containing magnesium alloys are replacing the magnesium-aluminum zinc type alloys.

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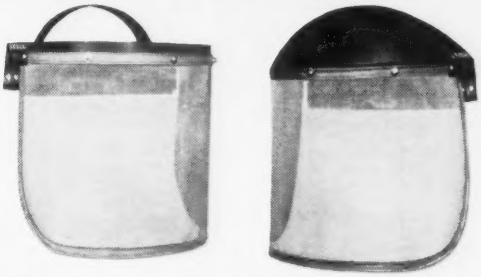

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bers of the AFS chapter met at Frankenmuth, Mich., on May 5 to hear two Foundry Educational Foundation scholarship students from Michigan State University discuss "Cleaning Equipment and Methods." Ormond Requadt, chairman of the chapter's educational committee, reported on the work of the committee in creating an awareness of the industry in high schools and junior colleges in the area.

A booklet is being prepared for distribution that will include a history of the industry and its place in the national economy, a list of area foundries and foundry publications, recent advancements and what the design engineer expects from castings.

Prof. C. C. Sigerfoos, Michigan State, introduced D. C. Freeman and C. J. Thomas, who discussed various types of cleaning equipment available, their advantages and disadvantages and maintenance problems and costs.

Officers elected for 1955-56 are F. P. Streiter, Dow Chemical Co., chairman; J. E. Bowen, Chevrolet Gray Iron Foundry, vice chairman; V. J. Sadler Jr., General Foundry & Mfg. Co., secretary, and F. A. Buike, Almont Mfg. Co., treasurer. J. R. Ikner, D. J. Christensen, T. R. Wiltse and H. V. Grieve were elected directors.—*Nicholas Sheptak, Dow Chemical Co.*

Northeastern Ohio: About 300 members and guests of Northeastern Ohio Chapter of the AFS met May 12 at Tudor Arms Hotel, Cleveland, to honor its past presidents and old-timers. David Clark Jr., Forest City Foundries, chapter chairman, presided only long enough to make several announcements before turning the meeting over to Walter L. Seelbach, Superior Foundry Inc., who served as chairman for the remainder of the program.

Nearly 100 old-timers were seated in groups at tables according to the number of years they had served. They wore distinctive boutonnieres and identification cards. An old-fashioned songfest was held between members at the various tables, and appropriate prizes were awarded the winning combinations. Ben Fuller, 91, who entered the industry in 1881, was made honorary chairman of the Old-Timers Club.

S. E. Kelly, Eberhard Mfg. Division, Eastern Malleable Iron Co., immediate past chapter chairman, presented outgoing chairman David Clark Jr., with a plaque in recognition of his service to the chapter.

It was announced officially that Northeastern Ohio Chapter had succeeding in its longtime goal of displacing Chicago Chapter as No. 1

group membership-wise in the national organization.

Newly elected officers for 1955-56 are Lewis T. Crosby, Sterling Wheelbarrow Co., chairman; Alexander D. Barczak, Superior Foundry Inc., vice chairman; E. Claude Jeter, Ford Motor Co., 2nd vice chairman; Howard E. Heyl, Federal Foundry Supply Co., re-elected secretary; and Harold Strater, North American Refractories Co., re-elected treasurer. Directors elected for three years are Walter Siebert, Cleveland Standard Pattern Works; Norman J. Stickney, Sand Products Co.; Robert H. Herrmann, FOUNDRY; A. H. Hinton, Aluminum Co. of America and Fred S. Green, Elyria Foundry Division, Industrial Brownhoist Co. J. H. Tressler, Hickman, Williams & Co., will fill the unexpired directorship of the late Arthur H. Harlan; and David Clark Jr., retiring chairman will be on the board for one year.—*Kenneth L. Mountain.*

Connecticut: Shuttle - Meadow Country Club, New Britain, Conn., was the site of the May 18 meeting of the Nonferrous Foundrymen's Association. A discussion of several papers presented at the 59th annual AFS convention in Houston featured the meeting. Stafford W. Chappell, General Dynamics, Groton, Conn., served as discussion leader for the program.

Papers discussed were "Improvement of Pressure Tightness and Tensile Properties of Gun Metal Bronze by Vacuum Degassing" by W. H. Johnson, H. F. Bishop and W. S. Pellini, "Vapor Holes from Loose Sand Grains in Brass and Bronze Castings" by F. Keller and W. B. George and "Short Time Elevated Temperature Properties of Three Copper Base Casting Alloys" by J. O. Edwards.—*Frank B. Diana.*

Central Michigan: Harry Kessler, Sorbo-Mat Process Engineers, St. Louis, was featured speaker at the May 18 meeting of Central Michigan Chapter of the AFS, held at the Hart Hotel, Battle Creek, Mich. Jack Secor, Hill & Griffith Co., was technical chairman.

Mr. Kessler discussed "Economics of Good Foundry Operation." In addition to his foundry career, Mr. Kessler is one of the nation's top boxing referees, and he told of many incidents regarding the "inside" of boxing.

Gardner Lloyd, Albion Malleable Iron Co., is newly elected chapter chairman and was presented the gavel by retiring chairman Lachlan Currie, Gale Mfg. Co.—*Lewis Heisler, Gale Mfg. Co.*

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News Views

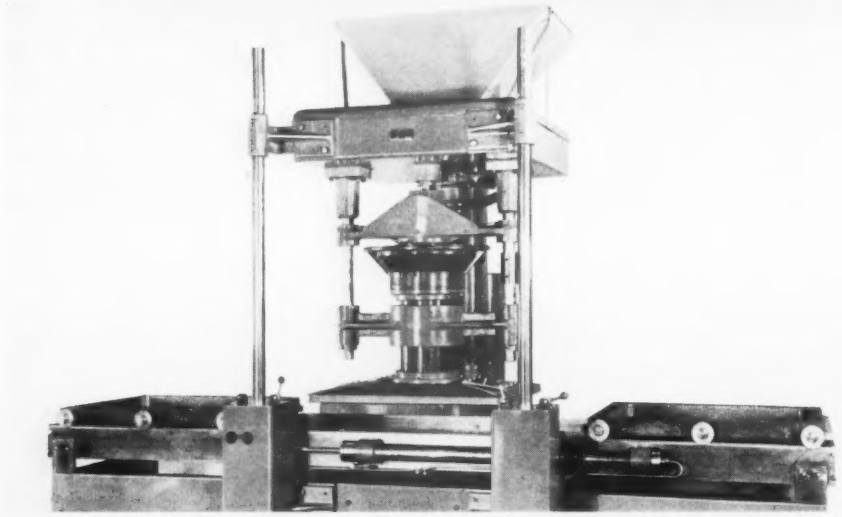
SALES CLINIC: Representatives of Delta Oil Products Co., Milwaukee, met recently to hold a sales meeting-foundry products clinic to advance the technical abilities of the representatives to better serve the diversified needs of their customers. Back row, left to right, J. J. Lee, V. D. Gornick, E. A. Rathlesberger, S. W. Hinrichs and W. Napp. Front row, left to right, R. L. Starek, R. P. Klumb, J. A. Gitzen, J. A. Cormack and R. A. Johnson

MORE BUT LESS: Increased use of aluminum in automobiles has grown to an average of almost 30 lb per car on 1955 models, according to a recent survey made by Aluminum Co. of America. Shown here is the more than 70 lb of aluminum parts, including castings, used in the Chrysler New Yorker deluxe sedan, allowing a weight reduction of 210 lb. While the 30 lb average is a small part of the car's total weight, this use will consume 178 million lb of aluminum if 6 million cars are produced, or 5 per cent of all primary aluminum expected to be made in the United States in 1955

TOP RECORD: Warwood, W. Va., Works, Continental Foundry & Machine Co., has been awarded the National Safety Council's highest award after compiling a record of 16 consecutive months, including the full year 1954, without a lost man-hour due to injury. Even though the award was based on only 1954, the plant has seen 376 consecutive work days without a disabling injury. Last previous lost-time accident occurred Oct. 16, 1953. As of Mar. 1, 404,189 man-hours with no lost time had been completed. The plant employs 138 persons and makes iron rolls for industry. National accident frequency rate of iron foundries in 1954 was 26.7 and this rate would mean one lost time accident occurring every six weeks in a plant of the size of Warwood's. Above, Warwood's safety director, H. J. Mullarkey, admires the award

NEW PLANT: Production bay in the recently-completed $4.5 million manufacturing plant of Electric Controller & Mfg. Co., Ceveland. The company, founded in 1897, makes a diversified line of products ranging from small resistors and switches to huge lifting magnets. The new one-story plant contains some 340,000 sq ft, including office space, and replaces six small multi-story buildings acquired over the years. Extensive engineering studies were made to incorporate into the design the latest mass production techniques, straight-line assembly methods and automation, yet allow flexibility to meet changes that come in the future

New Equipment and Supplies



Shell Blowing Machine: Harrison Machine Co., 2725 Station Rd., Wesleyville, Erie, Pa.—Semiautomatic two-station shell mold and core-blowing machines can be operated either as single or double units, allowing operator to complete the blow cycle on one station while curing cycle is being completed on the other. Three stock models are available—18 x 26 in. with 4-in. draw and 15 lb blow capacity, 20 x 28 in. with 4-in. draw and 18 lb blow, and 24 x 32 in. with 6 in. draw and 36 lb blow. Complete automation is available on all three.

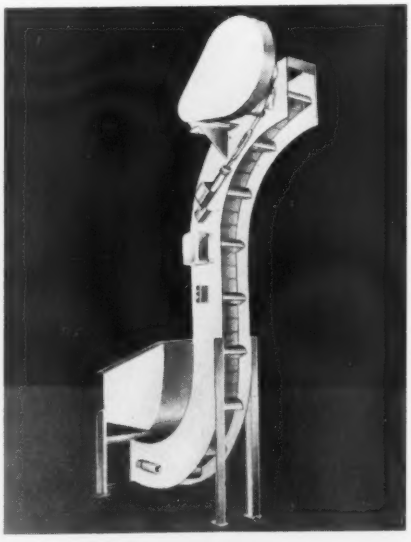
Two of the models finish contour molds and hollow contour cores in a 25-second cycle without use of separate driers or core ovens. Pattern plate and pattern contour backup plates are internally heated by individual thermostatically controlled elements. Operator presses two valves to complete cycle of positioning pattern, blowing, curing and ejection. Ejection is by air at 80—100 psi line pressure. Electrical controls operate from 110/220-v power while heating elements operate from 230-v power supply.

For More Details Circle No. 1—Page 251

Ladle Feeder: Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh, Pa. —Machine for making ladle additions of ferromanganese consists of a hopper, hopper loader, electrical vibrating feeder and chute moved by two air cylinders. As it moves forward, the chute, which rides on a fixed roller, is lowered toward ladle as its end approaches the desired location. When material has been added, assembly moves backward, withdrawing the chute as the metal nears the top of the ladle. Additions normally are started when ladle is about 20 per cent full and stopped when 80 per cent full. Up to 31.5 lb of ferromanganese per ton of ingots can be added successfully to the ladle.

For More Details Circle No. 2—Page 251

Bucket Elevator: M-H Standard Co., 515 Communipaw Ave., Jersey City, N. J.—Bucket elevator is said to have many uses, including measured feeding of parts to automated production lines, heat treating operations, and elevating parts to an overhead conveyor or bin. Material to be handled is dumped into feed hopper and picked up by bucket fastened to a moving metal belt. Belts are available in a variety of bucket paths by combining standard curved and straight sections. Capacity depends on model, spacing of buckets and speed of operation. Units are designed to meet customer requirements.

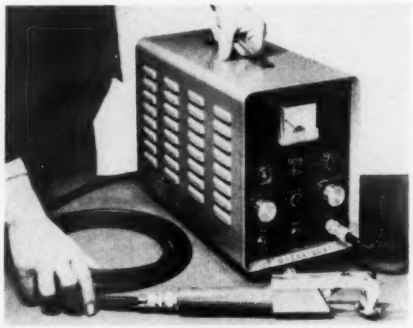


For More Details Circle No. 3—Page 251

Vibratory Tables: Vibro - Plus Products Inc., 54-11 Queens Blvd., Woodside, Long Island 77, N. Y.—Vibratory tables for compaction, separation, proportioning or cleaning operations are adaptable to conveyor and other handling applications of solids and free-flowing materials. Tables can be supplied to meet individual specifications and an extensive line of high-speed vibratory equipment also can be supplied.

For More Details Circle No. 4—Page 251

Seam Depth Indicator: Magnaflux Corp., 7300 West Lawrence Ave., Chicago 31, Ill.—Portable, electronic seam depth indicator nondestructively detects cracks in iron and steel and measures their depth. The sensing element is a scanning probe on a 10-ft cable. Relatively symmetrical parts can be scanned automatically, but for others, hand scanning is more practical. The unit will locate and measure the depth of defects from 0.012 to 0.120-in. deep. It will locate larger cracks without measuring their size over 0.120-in. Weight is 15 lb. The instrument can be used on flat pieces and on curved surfaces with a radius of 3½ in. or more. It weighs 15 lb and operates on any standard 115/60/1 power supply.



For More Details Circle No. 5—Page 251

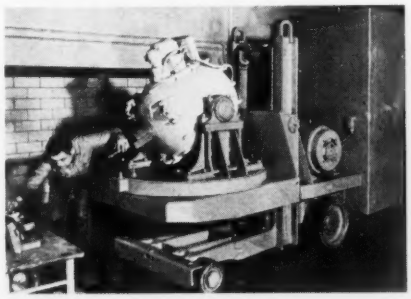
Crucible Linings: Electro Refractories & Abrasives Corp., Buffalo, N. Y.—Silicon carbide sectional ring linings are said to accommodate most large crucible furnaces. Interior diam-

For More Details on These Items
Use Reply Card—Page 251

eters of 34, 37 and 41 in. are available. Each ring for the 34 and 37 in. linings is comprised of three sections with tongue and groove ends. The 41-in. unit is made in four pieces. Rings contain at least 85 per cent silicon carbide. A description of these linings in the May issue erroneously gave the silicon carbide content as 5 per cent.

For More Details Circle No. 6—Page 251

Radioactive Test Unit: Babcock & Wilcox Co., 161 East 42nd St., New York, N. Y.—Cobalt 60 in-



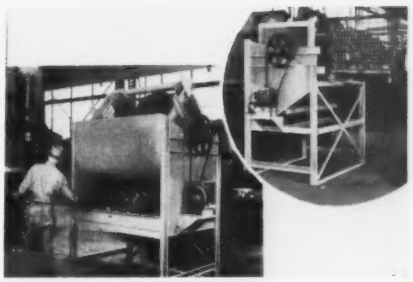
spection tool is said to be capable of radiographing steel up to 7 in. thick in one-third the time required by a 1-million-volt x-ray unit. A lead sphere is encased in a steel jacket with a cylindrical rotor section built into it. Revolving the rotor 180 degrees brings the radioactive source from the "safe" position to a point in line with a coned opening in the steel jacket, allowing a beam of radiation to escape. Balance of the unit consists of a modified electric platform lift truck with a "lead cab" on the back and a turntable on the front platform. The assembled unit can be raised or lowered through 8 ft and rotated vertically through 210 degrees and horizontally through 360 degrees.

For More Details Circle No. 7—Page 251

Rubberized Abrasives: Cratex Mfg. Co., 81 Natoma St., San Francisco 5, Calif.—Polishing kit to handle deburring, smoothing and polishing applications contains 24 polishing wheels, cones, blocks and mandrels for use on hard or soft metals, plastics, ceramics, glass or other materials. Each kit contains instructions on the applications of the abrasives. Coarse, medium, fine and extra fine grit types can be supplied.

For More Details Circle No. 8—Page 251

Box Rotor: Palmer-Shile Co., 16033 Fullerton, Detroit 27, Mich.—Low-speed, gear-operated box rotor

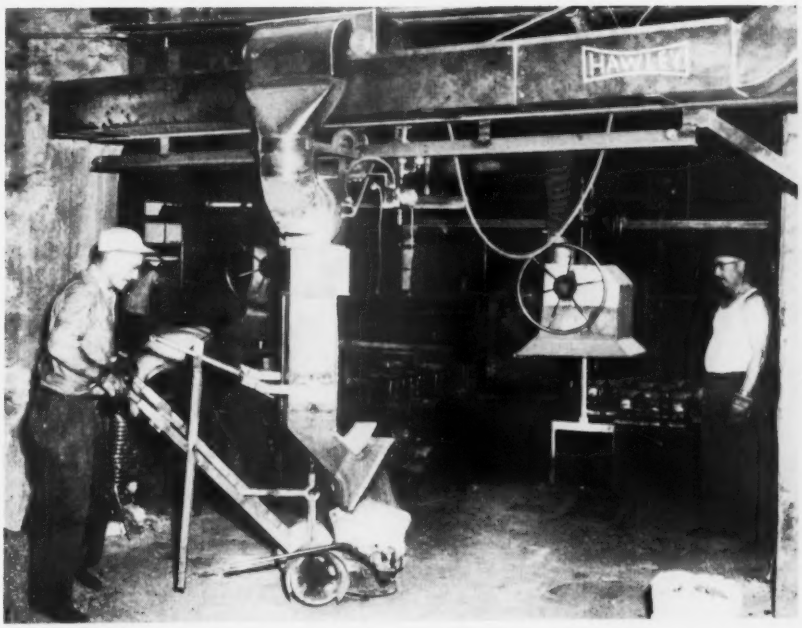


with feeding stand is said to be able to dump any size container. Dumping is done by a manually operated set of gears which tilt the box and empties small parts or other material into the feeding stand tray for disposal by standing or sitting workmen. Boxes of any type construction can be handled. Units are built to customer specifications.

For More Details Circle No. 9—Page 251

Core Binder: G. E. Smith Inc., 246 Washington Rd., Pittsburgh 16, Pa.—Cold setting binder process gives a high green strength to cores. Because of the absence of moisture, core baking time is cut 40 to 60 per cent. Approximately 2 per cent by weight of the binder, which is composed largely of vegetable oils, is mulled with a completely dry sand. An accelerator powder, the only other ingredient of the mix, is added in a ratio of 0.025 to 0.2 per cent by weight to speed up the process. The sand

Control System Traps Fumes At Source



FUME CONTROL system for entrapment of toxic and nontoxic fumes consists of a cylindrical or rectangular sheet metal hood suspended from a nonflammable flexible duct. The height of hood is adjusted so that it is directly above the ladle or crucible being used to pour molten metal into molds along a pouring line or above other work giving off fumes. Flexible duct is suspended from a mobile transition box which runs on a track mounted on top of an exhaust duct. Horizontal duct can be any length.

Fumes drawn into the system enter the exhaust duct at whatever point the mobile transition box happens to be. Transition box with its flexible duct and hood moves along from mold to mold as each is being filled with metal. Hood and duct can be integrated with mechanical pouring device or similar equipment. System is claimed to reduce health hazards and reduce plant heat loss in cold seasons as it operates with only 2500 cfm of air. The equipment is manufactured by Martin Equipment Co., Box 173, Wabash, Ind.

For More Details Circle No. 10—Page 251

Make high-strength aluminum castings without heat treatment!

Foundries without heat treating facilities are producing high-strength aluminum castings with Federated's Tenzaloy. Mechanical properties are equivalent or superior to the common heat-treated alloys, and impact strength is greater.

Tenzaloy, a product of Federated research, is a self-aging alloy of the aluminum-zinc-magnesium type. It reaches full strength after a few days aging at room temperature. No special casting precautions or facilities are required.

Tenzaloy castings have excellent machinability. They can be anodized to a superior white color. Tenzaloy is one of the few casting alloys that can be brazed at high temperature. It has corrosion resistance equal to or better than the aluminum-silicon alloys.

If your heat treating facilities are inadequate or too costly, or if you are paying for outside work, or if you are casting large and complex aluminum shapes which cannot be conveniently heat treated, call Federated for more information on modern Tenzaloy. Any of our 13 plants and 23 sales offices across the country is ready to help.

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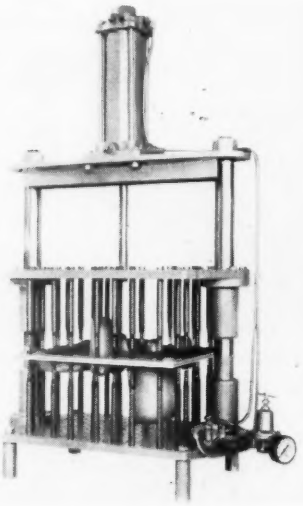
mix is poured into the box, not rammed, thus promoting uniform core hardness. Setting up time varies with the sand temperature and amount of activator used. Usual oven baking temperature is 400 to 450°F. Advantages claimed for cores made by this process include resistance to sagging, reduction in use of supporting rods and wires, increased production, and saving in rough cleaning time of castings because of high collapsibility of the sand at shakeout.

For More Details Circle No. 11—Page 251

Shell Fuser: Shalco Engineering Corp., Palo Alto, Calif.—Shell mold fusing machines can accommodate



molds up to 48 x 48 in. and at depths up to 9 in. or deeper if specified. Pins with spring-loaded ends are placed in various positions to suit particular shells to be joined. Paste or shell mold resin is placed on one of two hot shells, and shells are placed together in the fuser. Fuser closes on mold by air valve actuation and when shells are securely bonded, air valve is opened and finished mold is removed for pouring.

For More Details Circle No. 12—Page 251

Oscillating Conveyor: Gifford-Wood Co., Hudson, N. Y.—Oscillating conveyor designed with a minimum of moving parts is said to require almost no maintenance. The unit is a vibrating trough driven by rotating eccentric weights. Its components are a drive unit, a trough resting on rocker arms and coiled springs and a supporting base frame. Of unit construction, each conveyor is made up of one drive unit and any number of standard trough units. Three eccentric weights on the drive assembly are held on individual shafts. The shafts are geared together and driven by a countershaft belted to an electric motor. The assembly fits in a section of the

(*Continued on page* 261)

IDEAS FOR FOUNDRYMEN

HERE ARE QUICK REVIEWS OF NEW LITERATURE—available to foundrymen as "idea" and reference information. Readers in the United States and Canada may obtain copies by using the attached cards. Readers in foreign countries should write direct to the manufacturer offering literature.

81. Shell Mold Manual

General Electric Co., Chemical Materials Department, Chemical & Metallurgical Division, 1 Plastics Ave., Pittsfield, Mass.—Revised shell molding manual contains practical information on the advantages of shell molding as well as a comparison with overlapping processes. Fundamental steps are described and illustrated. Trouble shooting hints, production data, application studies, testing methods and procedures and a partial list of equipment suppliers is included.

82. Reciprocating Boosters

Miller Fluid Power Co., 2040 North Hawthorne Ave., Melrose Park, Ill.—Pamphlet details reciprocating booster operation and describes a basic circuit, two rapid pressure build-up circuits, two slow pressure build-up circuits, and mounting and dimensional data covering boosters in 4, 5, 6, 8, 10, 12 and 14-in. bores in 1 in. through 5½-in. diam rams.

83. Batching Scale

Richardson Scale Co., Van Houten Ave., Clifton, N. J.—Technical reference 54E describes and illustrates a shrouded, large draft batching scale for measuring dry aggregate materials. Uses, types of material handled, sequence of operation and special operating and accuracy features also are described.

84. Pulley Systems

Equipment Engineering Co., 2853 Columbus Ave., Minneapolis 7, Minn.—Brochure contains tables and specifications on company's pulley systems in addition to proven formulas to aid the user in selection of the correct pulley system for his application.

85. Crane Equipment

Harnischfeger Corp., 4400 West National, Milwaukee 46, Wis—Bulletin C5-1 illustrates and describes company's electrical accessory equipment for use with its overhead cranes. Motors, brakes, rectifiers, drum controllers, magnetic controllers, resistors, switches and current collectors are covered.

86. Gamma Radiography

Technical Operations Inc., 6 Schouler Court, Arlington 74, Mass.—Booklet offers basic information for setting up or operating a gamma radiography installation. It tells how to select the proper radioisotope for handling equipment and discusses the principles of radiation safety. Tables and charts show characteristics, radiographic sensitivity and speed of the isotopes.

87. Magnesia Manual

Magnesia Insulation Manufacturers Association, 1317 F St., NW., Washington 4, D. C.—Second edition of the "85% Magnesia Insulation Manual" presents 80 pages of text, illustrations and tables applicable to hot piping and equipment for users of heat insulation. One section is devoted to recommended application techniques for hot piping and equipment.

88. Refractory Guide

Chemicals Division, Kaiser Aluminum & Chemical Sales Inc., 1924 Broadway, Oakland 12, Calif.—Folder provides data on classification, application and special features of various types of basic refractory produced by company and lists name, number and other identification of sacked ramming mixes, bonding mortars and furnace grains.

89. Abrasion Handbook

Gates Rubber Co., 999 South Broadway, Denver 7, Colo.—"Handbook of Abrasion and Corrosion Protection" contains engineering information on methods and applications for rubber protection against abrasion and corrosion. Specific chapters on

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sand plants, coal and coke handling, cyclone and dust collecting systems, steel industry and general materials handling contain information of interest to foundrymen.

90. Hardwood Lignin

Mead Corp., Chillicothe, O.—Booklet, "Meadol, A Lignin From Hardwood," outlines the properties and industrial applications of an alkali hardwood lignin that has found use in the preparation of resin sand cores in conventional sand practice and as an extender for the resin used in shell molding sands.

91. Control Instruments

Fischer & Porter Co., 397 Jacksonville Rd., Hatboro, Pa.—Catalog 2 presents complete specifications including dimensions, prices, capacities and construction materials of a variety of process control instruments stocked for shipment from any of four locations strategically located around the country.

92. Centrifugal Pumps

Worthington Corp., Harrison, N. J. —Bulletin W-350-B14B includes photographs, outline drawings, parts lists and diagrams on applications and construction modifications of centrifugal pumps for acids, alkalies and slurries.

93. Band Saw

Porter-Cable Machine Co., 33 Exchange St., Syracuse 8, N. Y.—Form A984 presents specifications and details the features of portable electric metalcutting band saw that weighs 16 lb, can be used free hand in any position and has a stock cutting capacity up to 3¼ x 4¼ in.

94. Testing Machines

Riehle Testing Machine Division, American Machine & Metals Inc., East Moline, Ill.—Bulletin RG-14-55 is a guide to company's line of physical testing machines and instruments. Detailed bulletins on all the machines included in the catalog can be supplied.

95. Bulk Materials Handling

Brady Conveyors Corp., 20 West Jackson Blvd., Chicago 4, Ill.—Folder illustrates and describes a bulk materials handling system for transporting granulated, lumpy, and all bulk, dry materials to remote delivery points through air-activated pipe lines.

96. CO2 Hardening Handbook

Carver Foundry Products Co., 1056 Hershey Ave., Muscatine, Iowa — Handbook, "Carbon Dioxide Mold and Core Hardening Procedure," describes the characteristics, features and advantages of the CO_2 process with information on carbonic gas and its use, dry ice converters, binders, mixtures, sands, gassing methods and patterns and coreboxes.

97. Metalworking Machinery

Oliver Machinery Co., Grand Rapids 2, Mich.—Band saws, jig saws, band saw brazers, cutoff saws, cutting shapers, milling machines, grinders, polishers, lathes and accessory equipment for production metalworking are illustrated and described in bulletin 5501.

98. Air Compressors

LeRoi, Division of Westinghouse Air Brake Co., Milwaukee 14, Wis.—Advantages, features, dimensions, ratings, types of single and two stage air compressors are covered in bulletin W-5. Pressure tank data as well as charts on how to select the proper compressor also are included.

99. Foundry Equipment

Baker Perkins Inc., Saginaw, Mich. —Illustrated folder describes batch type core sand mixer, continuous sand mullers, liquid meters, sand scale and a laboratory type core sand mixer. Performance data and capacities of each are included.

100. Ingot Mold Washes

United States Graphite Co., Division of Wickes Corp., Saginaw, Mich. —Engineering bulletin 15 offers nine reasons why the company's ingot mold wash reputedly will increase profits, speed production, increase yield and improve quality.

101. Smoke Indicator

Combustion Control Division, Electronics Corp. of America, 718 Beacon St., Boston 15, Mass.—Bulletin CM-32 provides installation instructions and specification data on smoke density indicator system and auxiliary smoke density recorders.

102. Foundry Services

Rosedale Foundry Corp., West John St., Hicksville, Long Island, N. Y.— General brochure describes facilities for making production and experimental wood and metal patterns and aluminum, bronze and magnesium castings.

103. Welding Torches

Marquette Mfg. Co., 307 East Hennepin Ave., Minneapolis, Minn.—Complete data and specifications on five oxyacetylene torch and cutting sets are included in separate brochures 8093 through 8097, inclusive.

104. Globe Valve

Lunkenheimer Co., Box 360, Cincinnati 14, O.—Illustrated circular 602 describes a bronze globe valve with brinalloy seats and discs that reportedly are resistant to wear and corrosion.

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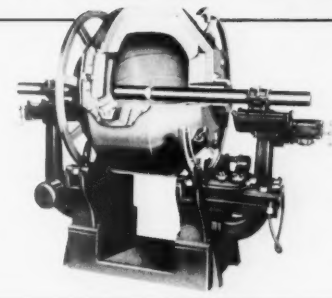
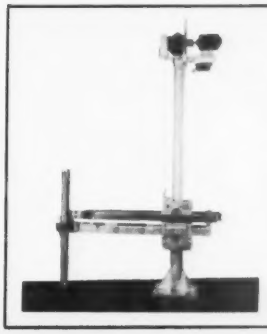


THE INDIRECT ARC ELECTRIC FURNACE—our feature article looks at this seasoned campaigner in the drive for better, more economical melting practice.

GUEST AUTHOR, Bruce W. Schafer, knows his indirect arc furnaces — he manages the company that makes them. Here's a valuable addition to the literature on this subject, prepared especially for Carbon and Graphite News.



ELECTRIC ARC HOT TOPPING offers drastic reduction of crop loss in foundry and mill. Experimental data are cited, with some actual applications and an estimate of the method's promise of new economies in common-steel ingot production.

CARBON AND GRAPHITE NEWS

JUNE-JULY, 1955—Vol. 2, No. 2.

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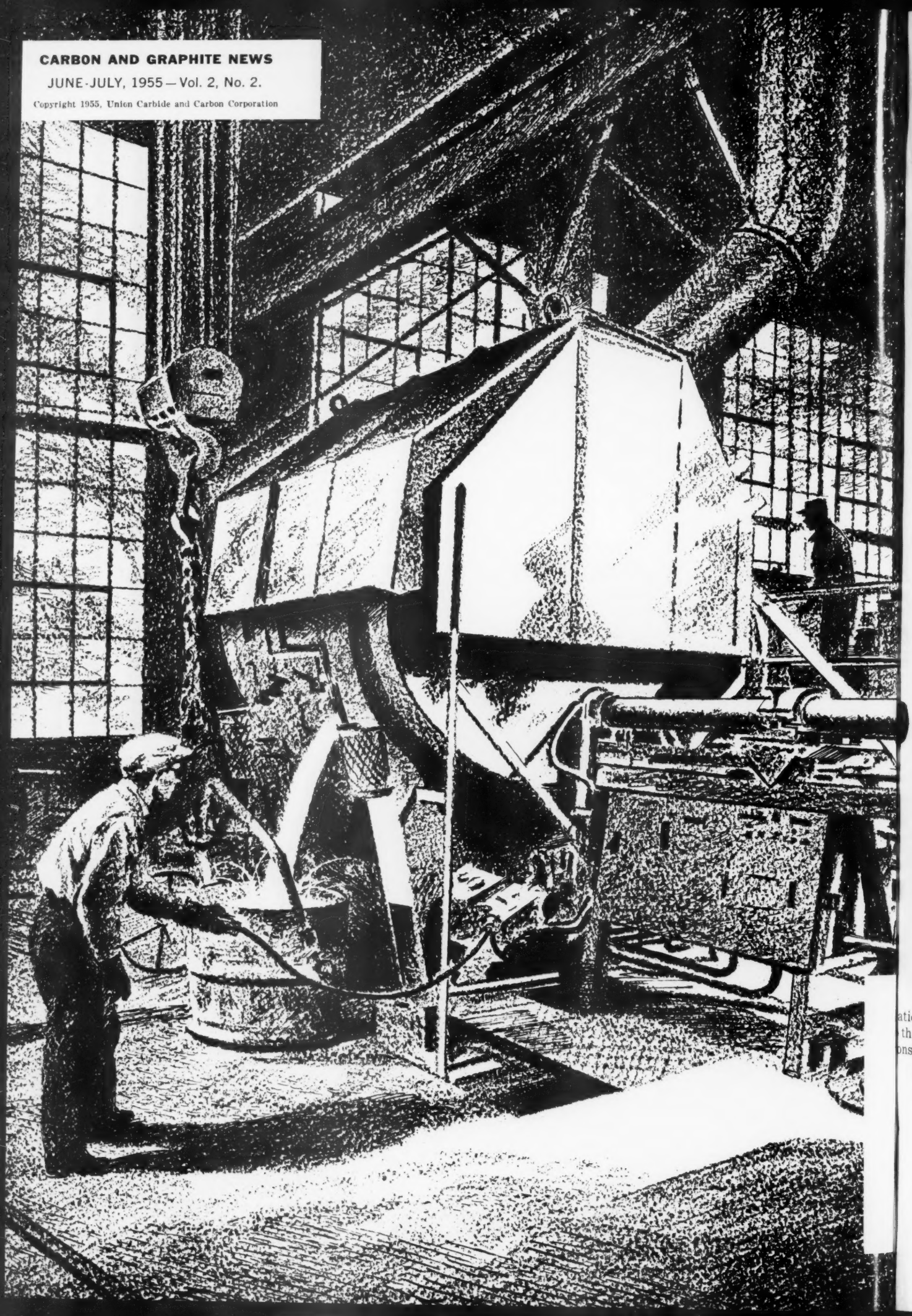


THE INDIRECT ARC ELECTRIC FURNACE DEVELOPMENT AND APPLICATION

By B.W. Schafer

THE INDIRECT arc electric furnace is as large a potential factor in the 5,000 foundries in America as the direct arc type is proving to be in the steel mills. Although the indirect arc furnace was developed primarily for non-ferrous metal melting, it has found a broad field of application in the melting of iron and steel. The types of metal melted in the indirect arc furnace are constantly becoming more numerous to keep pace with the growing needs of industry; as new alloys are produced, different melting techniques are likewise developed.

Indirect arc furnace capacity is now divided almost equally between ferrous and non-ferrous work. This capacity includes not only static sand castings but also permanent-mold and centrifugal castings. Installations for melting gray iron, white iron for heat and wear resistance, ductile nodular iron, special non-ferrous alloys, and stainless and special alloy steels are being made at an increasing rate.

The estimated 65,000-kw. connected load of indirect arc furnaces in the U.S.A. is divided roughly as follows: plumbing goods, 37.8%; bearings and billets, 31.4%; automotive iron, 13.8%; nickel anodes, 7.1%; education and research, 4.2% and miscellaneous, 5.7%.

The increasing use of the furnace is due chiefly to its broad versatility which offers the foundryman an ideal tool for producing castings of high strength and density, having homogeneous structure and closely controlled quality — all with the greatest possible economy.

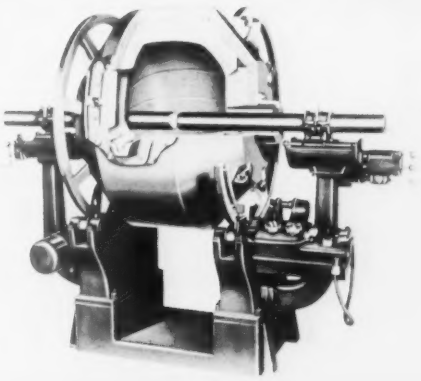
EARLY USES

The indirect arc electric furnace first came into commercial use in 1918, during World War I. Its success in the rapid and economical melting of brass and bronze to meet exacting specifications resulted in the installation of hundreds of such furnaces throughout the world.

From the beginning, the indirect arc has been instrumental in advancing the development of cast iron melting practices; the development of alloy irons, in the 1920's, led to the application of the furnace in this "specialty" field. Since accuracy of results and conservation of alloying elements were prime characteristics of indirect arc melting, the furnace gained immediate acceptance, notably by automotive casting producers.

Having been successfully applied to the alloy iron melting field, it was evident that the melting of many other types of metals would be practical. Among the first specialty metals explored were tool steels and hard surfacing materials such as chromium, nickel and cadmium. Many successful foundry operations today depend primarily upon the indirect arc furnace.

NATURE OF INDIRECT ARC OPERATION



The Indirect Arc Furnace.

The indirect arc furnace differs from other arc furnaces in two fundamental characteristics. First, the electrodes remain clear of the molten bath at all times, the heat being transferred to the charge by radiation from the arc between the electrodes. Carbon pickup from direct contact with the electrodes is thereby eliminated. Second, the furnace can be rotated about the horizontal axis of the electrodes. The melting chamber is rocked through an ever-increasing angle until 90 per cent of the refractory surface is covered by molten metal. This action constantly stirs the bath, insuring the complete homogeneity of the metal; the molten metal absorbs heat previously radiated to the refractory lining above the arc, thus greatly increasing the efficiency of heat utilization while, at the same time, decreasing the temperature of the lining and thereby increasing its life.

(Continued on next page)

ACKNOWLEDGEMENTS

ational Carbon Company wishes to express its gratitude the following organizations for their generous contribuons of time and information to the contents of this issue:

Detroit Electric Furnace Div., Kuhlman Electric Co.
Swindell-Dressler Corp.
Union Steel Castings Div. of Blaw-Knox Co.
Continental Foundry & Machine Co.
S. S. White Dental Manufacturing Co.
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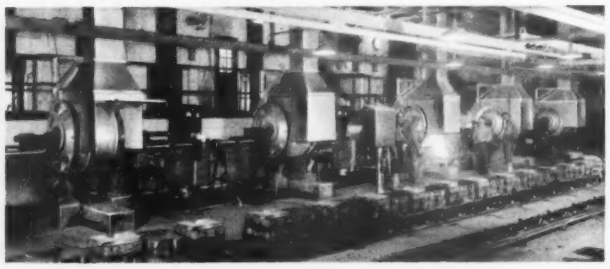
NON-FERROUS MELTING



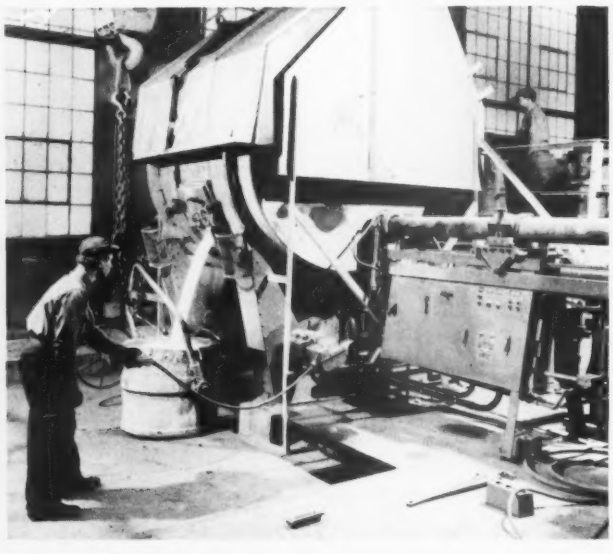
A battery of 700-pound furnaces melting leaded tin bronze for air brake castings.

The first commercial units used in this country were of sufficient size to make brass billet production economical. The furnaces were of 1 and 2-ton capacity. When applied to general foundry use, smaller sizes were needed to insure a steadier flow of hot metal to the pouring floor and to keep each furnace on continuous melting. Today, the most popular sizes for bronze foundry use range from 350 to 700-lb. capacity. For volume operation, batteries of these furnaces are employed to give added flexibility of capacity while retaining efficiency.

Melt time ranges from 6 to 60 minutes, depending upon the furnace capacity, consuming a maximum of 275 kw-hr. of power per ton of 75 per cent copper alloys and about 300 kw-hr. per ton of 85 per cent copper alloys.

The following table is a typical work-cost analysis of the indirect arc furnace melting of 2,000 tons of "82" metal (red brass) per year:

Power: 300 kw-hr., at $0.02	$6.00 per ton
Labor: 2 men, 8 hr/day	4.00 " "
Refractories: 2000 heats per lining, including patch	.75 " "
Electrodes: 4½ lb./ton, at $0.28/lb.	1.26 " "
Maintenance:	.55 " "
Melt loss: ½ per cent at $0.28	2.80 " "
Total cost	$15.36



Reclamation of manganese bronze borings, turnings and crops. Furnace capacity is 12,000 pounds.

PRINCIPAL ADVANTAGES

- Close control of temperatures, analyses and production.
- Reduction in metal losses, due to ability to control atmospheric conditions surrounding the metal during melting.
- Rapid melting, resulting in increased production and less volatilization, oxidation and gas absorption.
- Freedom from sulphur, oxides and gas contamination.
- The agitation of the rocking motion assures homogeneity of metal during the melting period.
- Elimination of fuel storage and handling.
- Long refractory life.
- Elimination of fire and explosion hazards.
- Improved working conditions in regard to health, cleanliness

This foundry calculated that it would receive a full return on its indirect arc furnace investment in one year, based on the savings from reduced melt-loss alone.

Great emphasis is being placed on the reclamation and recovery of non-ferrous metals. Many companies are using the indirect arc furnace for in-plant recovery of metals formerly recovered by some other method at a high cost or discarded because reclamation was not economical. Spillings, drosses, turnings and the like are efficiently recovered in rocking indirect arc furnaces on a tonnage basis, either by making up part of the melt charge with these materials, or devoting the full capacity of the furnace to a reclaiming charge. Recovered metals usually are cast as billets or ingots which can be worked back into the foundry operation. Billets so produced are in the form of wire bar, rolling mill stock or some other easily handled form.

FERROUS MELTING

Melting iron and steel alloys for automotive castings.

Use of the indirect arc furnace for melting steel is confined almost solely to the stainless, high-alloy and high-carbon types.

Under the indirect arc principle, melting and super-heating are carried out without a slag covering, which permits all of the alloying elements to go immediately into the bath for maximum alloy utilization. Since many alloying elements are quite expensive, this practice produces a substantial saving. There also is less likelihood of slag, gas and oxide inclusions in the product. Any percentage of fine scrap can be melted without appreciably increasing the percentage of metal loss by oxidation.

INDIRECT ARC FURNACE

ume , excessive heat and possibility of accidents.

The following may be cited as applying particularly to the melting of iron and steel:

No s ag is used so that the molten material has practically the ame chemical composition as the material charged.

The f act that no slags are necessary permits reasonable control of the nalysis without expert metallurgical operating knowledge.

The ocking action of the furnace provides automatic washing of the efractory lining, with the result that the walls are but little hotter than the metal. This promotes greater refractory life, as well as elimination of local overheating and more efficient utilization of the arc heat.

The desired amount of superheating may be obtained.

Straight carbon steel melts are made regularly in the indirect arc furnace by charging good, clean steel scrap of the same composition as ultimately desired. When such melts are made, additional deoxidation should be provided by adding aluminum or other available deoxidizing agents to the charge. By proper care in the selection of the charge and in melting, no detrimental effect on the life of the lining should result.

Reducing, oxidizing or neutral melting atmospheres can be provided, as desired, thereby affording a valuable control of chemical reactions in the molten bath and allowing much broader latitude in controlling the time devoted to superheating.

The economies available in ferrous practice are evident in the fact that only from 12 to 90 minutes are necessary per melt, the time depending upon the capacity of the furnace and the type of charge. Average current consumption per ton of either gray iron or malleable is 600 kw-hr.

The indirect arc furnace is used for duplexing by charging metal from the cupola to the furnace for superheating and for the addition of alloying materials such as manganese and chrome; or nickel and chrome may be melted in the electric furnace to make molten alloy additions to the ladle. In either case, a higher recovery of alloys is obtained than in straight cupola melting. The economics of duplexing are very favorable as shown by an average use-figure of 100 kw-hr. per ton for each 300 degrees F. of temperature rise.

Ductile irons, one of the outstanding foundry developments since the introduction of malleable iron, are a relatively new family of cast metals that have been added to the long list of indirect arc furnace products. The ductile irons, to a large degree, bridge the gap which long existed between cast iron and steel. They have the processing advantages of cast iron — good fluidity and castability, ready machinability and low melting point — combined with many of the engineering advantages of steel — good strength, toughness, wear resistance and substantial ductility. Ductile iron can be bent, twisted, drawn and otherwise deformed without fracture, and has several times the strength of ordinary gray iron, in addition to an exceptional resistance to shock. These are highly desirable properties for parts that are too intricate to be cast in steel or for those having inadequate mechanical properties when cast in gray iron. In addition, producing ductile iron in the indirect arc furnace adds a high degree of flexibility with respect to size, intricacy and number of castings that can be produced economically at a given time.

The making of synthetic iron in the indirect arc furnace represents a "reverse process" in which steel scrap is charged and carbon added, to produce high grade iron. Where small amounts of iron are required, the indirect arc furnace is economical by virtue of its ability to use low-priced steel scrap and to permit very close control of the charge.

It is well to emphasize that, as new alloys are produced, different melting techniques are developed, none of which has been troublesome because of the flexibility and versatility of the indirect arc furnace.

INVESTMENT CASTING

Precision-casting of jet-engine components by the "lost-wax" process.

Immediately prior to and during World War II, the Investment Casting or "lost wax" process developed into wide use to solve many critical problems caused by the drastic shortage of machine tools. It was used for casting highly-alloyed steels and very intricate sections that were previously machined from solid stock.

The "lost wax" casting technique was used by the ancients for making jewelry and other articles having complex shapes and design features, and requiring accuracy and fine surface finish. An exact replica of the article to be reproduced was made in wax; the wax form was then coated with a thick layer of fine, clay-like moulding material, after which the wax was melted out to leave a form

(Concluded on last page)

Advertisement

CROP LOSSES REDUCED WITH ELECTRIC ARC HOT TOPPING

EVEN in the days of relatively moderate labor, fuel and equipment costs, considerable interest and experimentation were directed toward improving sound-metal yield in ingots and large castings. Various designs of clay and ceramic hot tops and exothermic fluxes were, and are, among the methods used.

The presence of either of two conditions is alone sufficient to place a high value on effective hot top practice: (1) high *handling* costs encountered in cropping and re-processing scrap from very large ingots and castings; or (2) high *material* cost as represented by the crops of high-alloy product.

First Used on Non-Ferrous Ingots

This latter consideration led to the pioneer development of arc hot top equipment and practice by the International Nickel Company, Inc. at its Huntington Works. Applied exclusively to non-ferrous ingot castings of high nickel content, the method was in commercial use by 1924 and, with some refinements, is still used today.

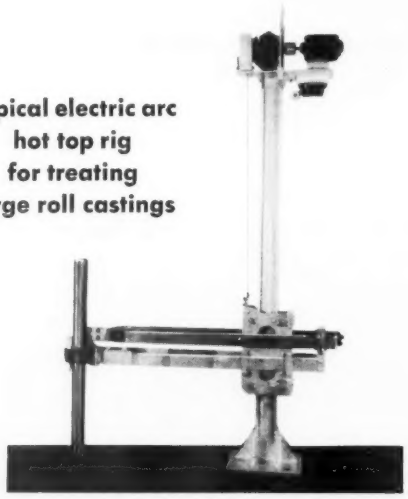
Despite early unfavorable speculation regarding its applicability to ferrous metals with marked segregation characteristics, electric arc hot topping has been used successfully on many types of high-carbon steels and, on the basis of experience to date, promises to deliver substantially the same advantages on ingots and castings of mild-steel and low-alloy content.

Foundry Applications

At the opposite extreme from those of non-ferrous ingot production are steel foundry problems resulting from metal shrinkage in large roll castings. Here tremendous masses are involved. The costly torching and/or lathe-cropping of sink-heads weighing up to ⅔ of the rolls themselves, the low quality of metal remaining in the crops, the necessity for cleaning and splitting massive scrap for re-processing — all combine to place a premium on reduction and control of the riser.

Early arc-top installations in roll foundries required manual adjustment of the electrode column with resulting high labor cost and occasional failure of the arc. Recent installations favor automation, with power adjustments being made at a single remote panel for all units in operation. Virtually the only attendance required is for the purpose of adding such slag as is necessary to maintain a stable arc. Because masses are large and the sand molds have an insulating effect, solidification is slower, and longer application of the hot top is necessary than in mill practice. Cycles range from seven to 24 hours, depending upon a function of the column and length/diameter ratio of the roll.

At least one such installation was originally equipped with holders for 3″ graphite electrodes, but was later converted to 4″ diameter to obtain a burning time of approximately nine hours. This installation uses a single electrode, but others, employing two and three-electrode rigs, also favor



Typical electric arc hot top rig for treating large roll castings

the 4″ x 40″ size for optimum burning time and consumption per ton of metal.

One foundry reports a 50% reduction in sink-head weight by electric arc hot topping which — besides the obvious savings in fuel, handling and materials — enables them to pour castings in a single heat which formerly required a second heat to fill the head. Prior to arc hot topping, this foundry sometimes found it necessary to torch off a portion of the head in order to get a roll into the annealing furnace. Since experience had shown that rolls must be lathe-cropped in any event, prior to turning, this last situation was especially undesirable and has not occurred since arc hot tops were installed in 1950.

Roll metal is in the high-carbon range — .50 to .250 points — and may contain, in addition, nickel, chromium, molybdenum and tungsten in varying proportions. Since rolls are bottom-poured through a tangentially-located sprue, the swirling action of

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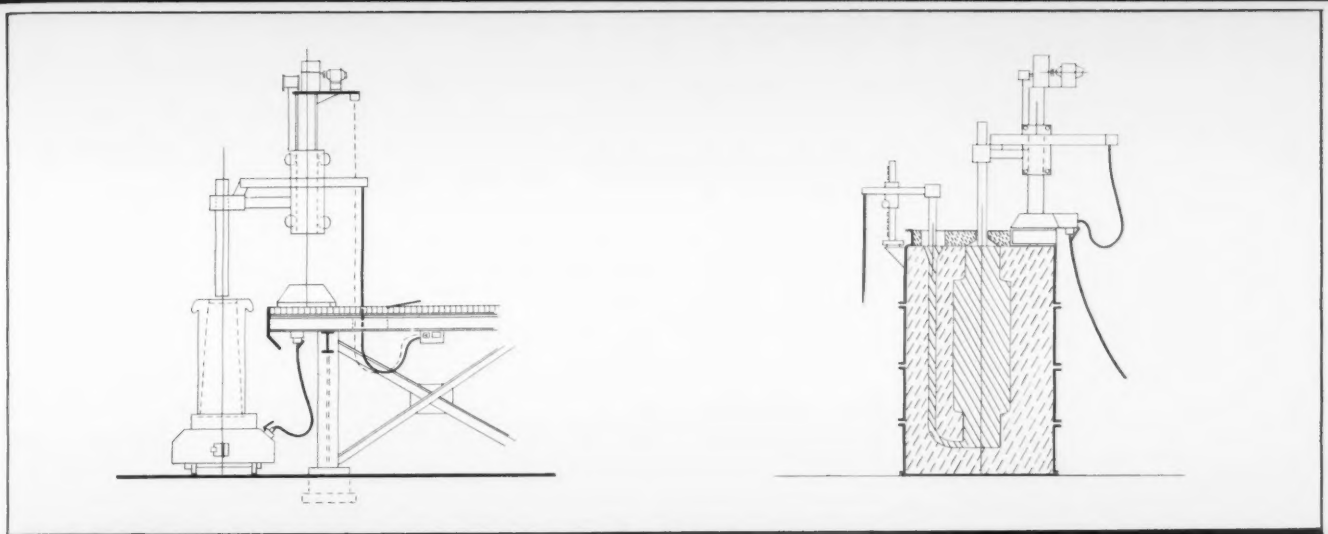

Schematic arrangement of equipment suitable for hot topping both castings and ingots. Two and three-electrode power units are also used.

the entering metal tends to force any segregates toward the longitudinal centerline of the casting where they are well within specification tolerances. It is interesting to note that, while results of early experiments on ingots revealed a *negative* carbon segregation in the arc hot top, one foundry refers to carbon "pick-up" when arc-treating low-carbon steel. However, this same company has hot topped low-carbon anvil castings up to 268,000 pounds in a single piece with excellent results.

Some Notes From Abroad

Reports on European practice indicate a much wider commercial application of arc hot topping in steel mills there than in this country. Experience ranges from 200,000-pound forging ingots to 200-pound tool steel ingots. A French report states that piping is completely eliminated and segregation measurably improved in arc-topped ingots. Slag practice, which may materially influence the latter condition, is not described. Austrian practice appears to be highly successful in ingot production, subject to a strict set of conditions – among them the observance of a 1:2 ratio of ingot diameter to length. Other countries reporting favorable results in both mill and factory arc-treating include England, Germany and Belgium.

Prospects For Ferrous Ingot Production

What is the outlook for electric hot tops in U. S. mills? Every increase in the cost of labor, fuels and raw materials brings additional economic pressures toward higher ingot yield and improved quality of metal. As the demand increases for high-strength and other special-properties steels, the greater unit-value of product further aggravates the expanse of crop-handling and re-processing. The last 50 years have seen substantial reduction of crop-loss. Is arc hot topping the next big step forward in tonnage-steel production economy?

Some time ago, National Carbon Company, A Division of Union Carbide and Carbon Corporation, conducted experiments to determine the best electrode size, power characteristics and treating time necessary to reduce or eliminate top shrinkage due to piping in ingot castings. Experimental ingots were 8-inch square; electrodes, $\frac{3}{4}$" and 1" diameter; slags included lime-silica-magnesia and preformed silica lime. Electrode consumption on this small-scale operation was about 8 ounces per ton of ingot, with power averaging 14 kw-hr. per ton – both low figures by comparison with European practice. Low-carbon, low-alloy steel ingots, rolled without cropping, did not split. Stainless ingots were fully workable with less than 5% crop-loss.

Such encouraging results prompted production-scale tests, which were carried out in the mill of a large Eastern producer. Here, ingots were arc-treated and compared with standard ingots. The comparison ingots showed blow-holes extending more than a foot below their standard clay hot tops. Ingot surface in the treated molds was perfectly flat. Some negative segregation of carbon, manganese and silicon was discovered in the upper third of the electrically-heated ingots due, it is believed, to the use of siliceous slags in treatment. There is every reason to believe that such losses can be corrected by proper slag adjustment.

With a history of more than 30 years in the field of specialty-metals ingot production and with numerous foundry applications, electric arc hot topping is a highly developed practice, offering possibilities of greatly increased efficiency in the growing steel industry.

Previous issues of CARBON AND GRAPHITE NEWS are still available.

Write National Carbon Company, Dept. F, 30 East 42nd Street, New York 17, New York, giving name, title and company address.

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Advertisement

THE INDIRECT ARC ELECTRIC FURNACE DEVELOPMENT AND APPLICATION

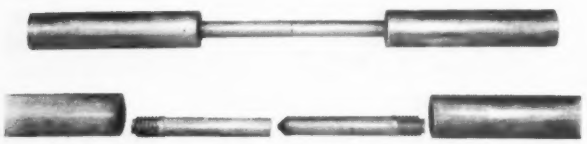
(Concluded)

into which precious, semi-precious or base metal was cast. After the metal solidified, the mold was broken apart to release the finished casting.

Much the same technique is being used today to meet the rapidly growing demand for precision castings. Indirect arc furnaces are admirably suited to this kind of work. For investment casting, a special furnace design has been developed which works as follows:

An air-cylinder clamp attachment holds the mold firmly to the melting chamber which then is inverted to transfer the molten charge to the mold. At this point, air pressure can be applied if necessary to completely fill the mold cavities. A larger, standard furnace may be used to produce the exact analysis required which is cast into rod or shot and charged cold into the special furnace for remelting and casting

RESISTOR FURNACES



Resistors and terminals for the resistance-type furnace are shown (above) in operating position and (below) disassembled.

Early in the development history of the indirect arc electric furnace it became apparent that many highly volatile as well as low melting-point alloys would be overheated by the 6,000-degree heat of the arc. A lower temperature was possible by using resistor heat in the indirect arc type of furnace. Graphite is the only resistor material available that will withstand thermal shock and high temperature and give a non-oxidizing atmosphere. Essentially, the resistor gives a lower temperature, radiant heat over the entire length of the metal bath. While its efficiency is lower than the indirect arc furnace, steady, easily controlled heat combines with noiseless operation to make the resistor furnace a desirable melting unit for certain applications, such as on ship board. Since it is practically a closed-atmosphere furnace, the metal does not volatilize or oxidize, a fact that makes it most suitable for yellow brass and for melting zinc. Although the temperature range is very broad, the resistor furnace is most efficient at relatively low temperatures.

Resistor rods can be either one or two-piece, secured in graphite terminals extending outside the furnace wall for connection to the power source. The two-piece resistor is used when it is desirable to clear the melt chamber for charging. The conversion of an indirect arc furnace to the resistor type requires a larger capacity transformer because of the radically different power demand characteristics.

CONCLUSION

The indirect arc furnace is being used for a wide variety of metals, divided roughly into three main categories: bronze, iron and specialties.

Bronzes	*Irons*	*Specialties*
60-30 brass	Short cycle malleable	Copper
81-82 plumbing goods	Plain gray iron	Nickel
Navy M, G, Ounce	Ni-Cr-Mo iron	"Monel"
Aluminum bronze	Ductile iron	Stainless steel
Manganese bronze	Nodular iron	Ni steels
Silicon bronze		Beryllium copper

New controls, electrical circuits and mechanical devices have increased the versatility of the indirect arc furnace to the point of making it an almost universal foundry unit. There is no doubt that, as demands are made for new materials, for more specialized products and more economical ways to produce them, the indirect arc furnace will continue to display its flexibility and economy of operation.

B. W. SCHAFER *claims the State of Michigan and, particularly, the Tri-Cities Area as the center of both his home and professional life. Born in Michigan, he received his B.S. in Chemical Engineering from Michigan State College. Following four years' experience at Dow Chemical Company's Electrothermal Division, working on the thermal reduction of magnesium ores, Mr. Schafer joined Detroit Electric Furnace Division, Kuhlman Electric Company, Bay City, Michigan. Now Manager of that Division, he brings to his appraisal of modern melting practices a broad knowledge of foundry problems and objectives.*

***ACHESON* Plant, Niagara Works of National Carbon Company, a Division of Union Carbide and Carbon Corporation.**

Fourth in a series featuring the five National Carbon Company plants devoted to manufacturing carbon and graphite electrodes, *Acheson* Plant, shown here, is one of three integrated locations which together make up the Company's Niagara Falls Works. *Acheson* Plant facilities account for the graphitizing and machining of all "National" graphite electrodes produced in the area. Sister Plants, *Republic* and *National*, conduct forming, baking and machining operations on "National" electrode products.

LITHO IN U.S.

(*Continued from page* 250)

conveyor 5 ft long. Any dry aggregate material can be handled. Troughs range in size from 8 to 24 in. wide.

For More Details Circle No. 13—Page 251

Electric Chain Hoist: Chisholm-Moore Hoist Division, Columbus McKinnon Chain Corp., Tonawanda, N. Y.—Electric chain hoist has been designed to minimize expensive maintenance or interruptions in work schedules. Features include shockproof pushbutton control; sealed-in,

lifetime lubrication; self-adjusting, heavy-duty brake; overload protection; fully enclosed and protected components, safety limit switches, light weight; compact size; and low head room. A jamproof chain guide and nonkinking flexible link chain permit the hoist to be used for extreme angle pulling. The single-phase model (without contactor) can be used for side pulling and also can be used upside down for jobs where installing a hoist overhead is inconvenient. Unit is available in capacities ranging from ⅛ to 1 ton.

For More Details Circle No. 14—Page 251

Line Marker: Jawco Products Corp., P. O. Box 1224, York, Pa.—Line marker paints 2, 3 or 4-in. lines on any hard surface, and brush sizes can be used interchangeably. Operator maintains desired pressure on the brush by varying the position of the liner handle. The brush can be lifted completely off the painted surface by raising the handle toward a vertical postion. Paint flow is controlled by a valve lever on the handle. Unit is available in 2 and 4-qt capacities.

For More Details Circle No. 15—Page 251

Antiseptic Oil: E. D. Bullard Co., 275 Eighth St., San Francisco, Calif.—Previously available in ointment and liquid form, antiseptic oil for burns and other wounds now is packaged in 5.5-oz aerosol spray containers. Application is painless and sanitary. Container holds enough medication for 150 seconds of continuous spraying, or enough to cover an area of about 6 sq ft.

For More Details Circle No. 16—Page 251

Lighting Fixtures: Sylvania Electric Products Inc., 1740 Broadway, New York 19, N. Y.—Industrial lighting fixtures use high-output, 8-foot rapid-start fluorescent lamps to provide more light per dollar of cost through reduction of number of fixtures while still maintaining the same level of illumination, according to the manufacturer. Various type reflectors are available.

For More Details Circle No. 17—Page 251

Woodworkers' Vises: Wilton Tool Mfg. Co., 9525 Irving Park Rd., Schiller Park, Ill.—New line of woodworkers' vises includes eight models in either continuous or rapid-acting types. Latter are said to operate as two vises in one because they change from free-sliding action to screw-lock action automatically. With the screw and nut engaged, tighten-

FOX

HIGH-SPEED STAND GRINDERS

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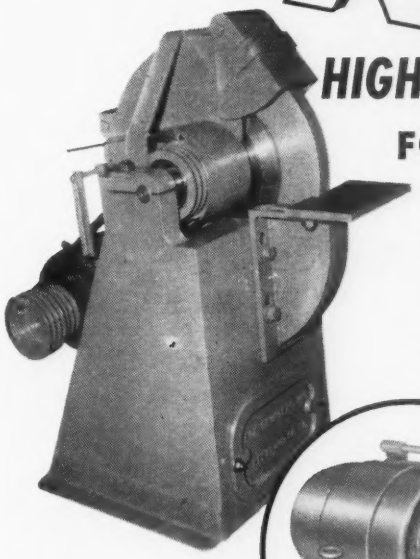

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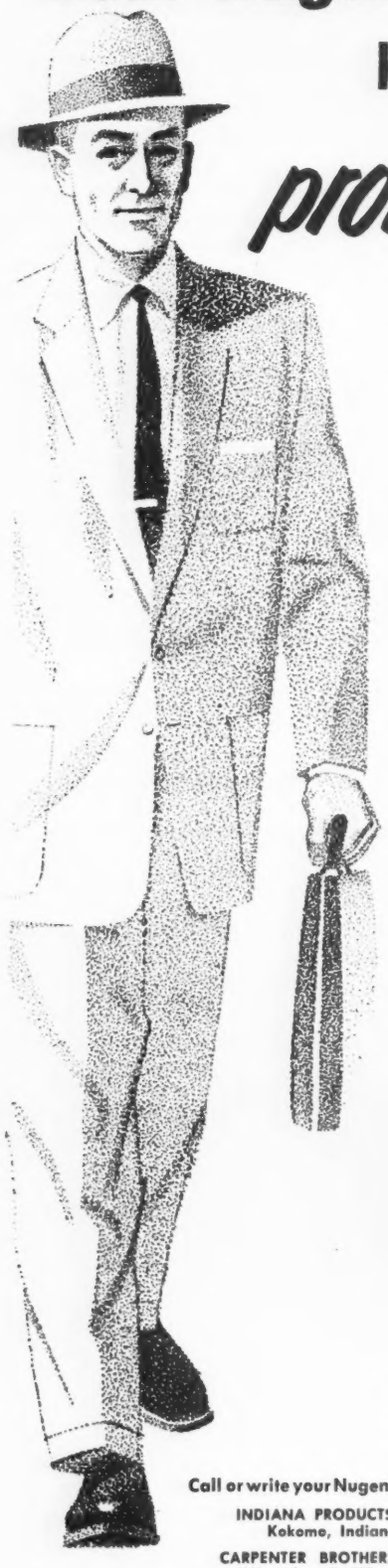

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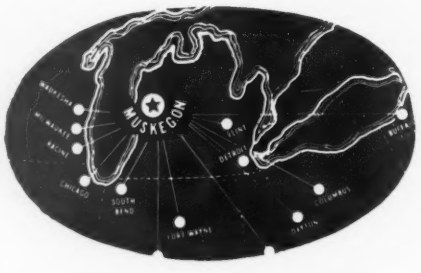

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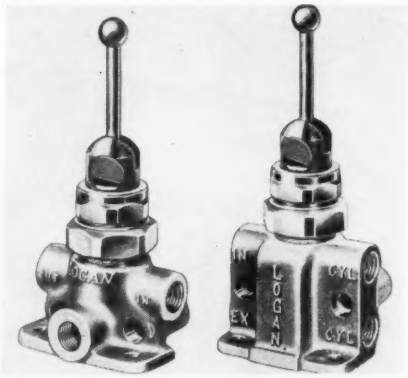
ing action can continue a complete turn or more. Nut on the rapid-acting models is malleable iron, a complete oval with no moving parts. A continuous-threaded screw eliminates sharp, destructive edges. All models, of either type, include a dog in the front jaw.

For More Details Circle No. 18—Page 251

Air Control Valves: Logansport Machine Co., Logansport, Ind. —Three air control valves with locking toggle are available. One is designed for control of bleeder and pilot-operated master valves. Another is a variation of the first with two exhaust openings to permit bleeding both ends of master valves alternately. A third is a 4-way, 2-position valve, side or base mounting, designed for manual control of double-acting air cylinders. Valve ports on the models are ¼-in.



For More Details Circle No. 19—Page 251

Grinding Wheels: Tru-Matic Products Co., 23 Ross St., Wharton, N. J.—Three new lines of all-purpose grinding wheels for general industrial use are readily identifiable by their colors: Green for heavy cuts, red for hard steels and blue for extra-fine cutting. Suitable for most bench or pedestal type grinding operations, they are available for virtually all types of grinding equipment, in a variety of angles, and for extension wheels. In the forming of the wheels, an insoluble bond is used in many operations to withstand effects of cutting oils or coolants. Diameters offered are 1, 1½, 2, 2½, 3, 3½, 4, 4½, 5, 6, 7, 8, 9, 10, 12 and 14 in.

For More Details Circle No. 20—Page 251

Fire Extinguisher: Walter Kidde & Co., Belleville, N. J.—New 10-lb pressurized dry chemical fire extinguisher carries Underwriters' approval for a pressure range of from 150 to 250 lb. Unit works satisfactorily when only 150 lb of air pressure is available, but packs a harder punch at 250-lb pressure. The device features a pistol grip trigger release mechanism, a dust and moistureproof

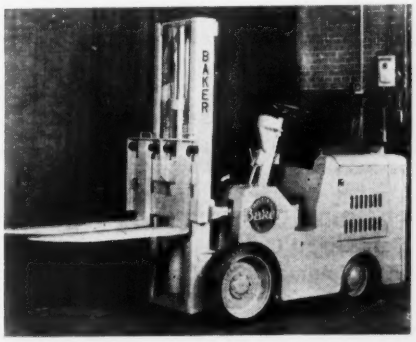
gage which shows charged pressure at a glance and a diffuser horn which gives wide coverage of the discharge pattern.

For More Details Circle No. 21—Page 251

Dry Ice Crusher: Franklin P. Miller & Son Inc., 36 Meadow St., East Orange, N. J.—Low-temperature treatment and shrinking of metals, and the making of frozen mercury dies and patterns, are said to be greatly speeded by crushing into small nodules the dry ice used for cooling. The crusher will reduce a 50-lb block of dry ice in a minute or less. Crushed sizes available are adjustable from ½ to 1½ in.

For More Details Circle No. 22—Page 251

Gas-Electric Truck: Baker-Raulang Co., 1223 West 80th St., Cleveland 2, O.—Company's line of gas-electric trucks has been augmented by a 3000-lb model. Like larger models in the line, the new unit utilizes a variable-voltage generator integral with a gasoline engine, giving the performance of a gas engine truck with the economy of an electric truck. Clutch, transmission and gear shifting are eliminated. The truck features a foot-operated inching control which permits high-speed hoisting at low travel speeds. Travel speed is regulated by an accelerator pedal. The power unit is



a Hercules four-cylinder engine. The hydraulic system is low-pressure, with a continuous-flow pump supplying oil to lifting and tilting cylinders. Maximum travel speed with full load is 8 mph, and full-load lifting speed is 40 fpm. Total lift height is 130 in. The power axle has a single-reduction worm gear drive.

For More Details Circle No. 23—Page 251

Air-Hydraulic Booster: Miller Fluid Power Co., 2040 North Hawthorne Ave., Melrose Park, Ill.—Continuous-action, automatically reciprocating air-hydraulic booster operates from ordinary plant compressor air input and delivers an unlimited amount of high-pressure fluid for operation of hydraulic cylinders. Booster consists of a double-rod end air cylinder with a hydraulic discharge pressure chamber at each end and de-

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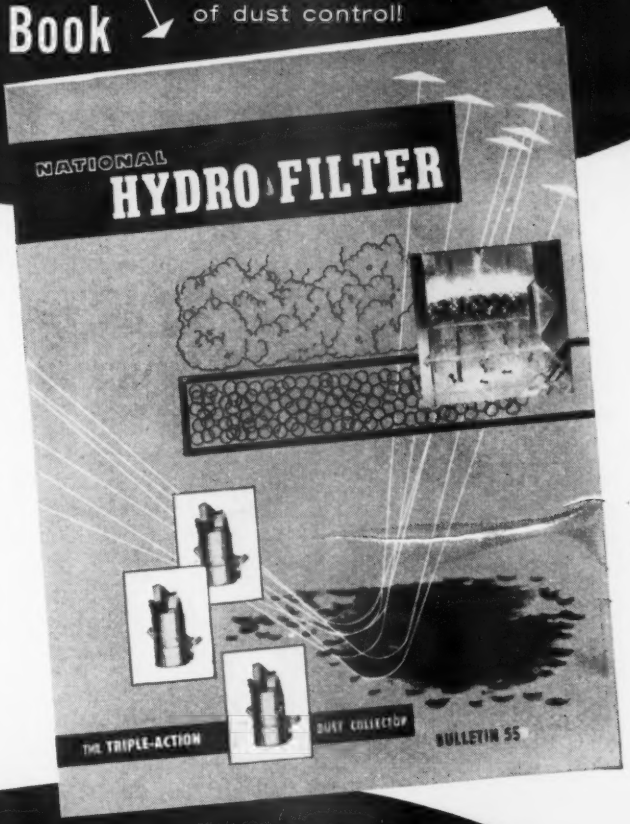
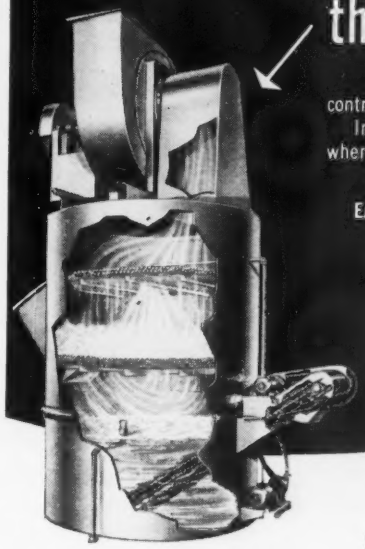


Here is the Collector . . .



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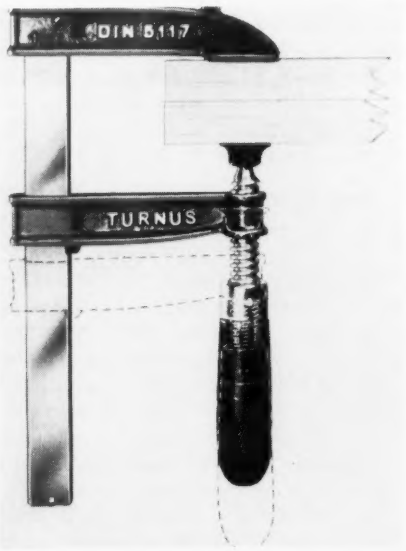
livers a pressure output stroke in both directions. It is available in all ratios to give pressures to 10,000 psi and over.

For More Details Circle No. 24—Page 251

Wood Clamp: Turnus Tools, East Hartford, Conn.—German-made "G" clamp makes it possible to do work which formerly required six different size "C" clamps in applications in wood and metalworking



shops. Design of the clamp features a "zip-action" setting in which the clamp is slipped up close to the work and tightened securely with one or two turns of the screw. Disengaging the clamp is said to be as simple and as fast. Two sizes, 2 in. and 3 in., can be supplied but larger sizes also are available.

For More Details Circle No. 25—Page 251

Lining Compound: Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia 7, Pa.—Corrosion-resistant neoprene lining compound said to flow like paint on to a variety of industrial surfaces such as fan blades, fume ducts, process vessels, pump impellers, valves and piping, provides protection for metal, concrete or wood where heavy-duty coating or lining is required. Application can be made by brush, roller, spray or dip methods to plain as well as irregular shapes and surfaces.

For More Details Circle No. 26—Page 251

Air Cylinder Speed Control: Valvair Corp., 454 Morgan Ave., Akron 11, O.—Since speed control of air cylinders has become increasingly important in the field of automation, the company has designed a simple arrangement to add the speed control feature to its solenoid, pilot operated valves. This arrangement accomplishes the restriction of flow through the main control valve, elimi-

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nating the need for separate flow control valves. Adjusting screws have been added in the end caps which restrict the stroke of the main stem of the valve and thus restrict the flow of cylinder exhaust air through it. The speed control feature also will be available as a kit to convert valves already in service. Valves with built-in speed control and conversion kits are available for four-way foot mounted and sub-base mounted, single and double solenoid, in sizes ¼, ⅜, ½, ¾ and 1 in.

For More Details Circle No. 27—Page 251

Fire Protection: Ansul Chemical Co., Marinette, Wis.—Automatic fire protection against Class B and C fire hazards is provided by a dry chemical conveyed through pipes and expelled in area surrounding the hazard. System can be installed to protect such hazards as spray booths, ovens, driers, oil quench tanks, paint dip tanks, transformer vaults, diesel and gasoline engines, generators, oil storage tanks, and other similar installations. System can provide for either manual or automatic operation.

For More Details Circle No. 28—Page 251

Abrasive Blades: Clipper Mfg. Co., 2800 Warwick, Kansas City 8, Mo.—Abrasive blades for masonry cutting of every masonry material are reinforced out to the cutting

edge with glass fiber webbing and have additional reinforcement on both sides of the hub. Both sides of the blades are covered with thousands of raised abrasive "polkadots," each acting as an extra cutting edge. Available in standard 12, 14 and 18-in. diameters, the blades can be supplied in a complete range of specifications for cutting any masonry material, hard to soft.

For More Details Circle No. 29—Page 251

Steel Building: Wonder Building Corp. of America, 30 North La Salle St., Chicago, Ill.—Trussless, prefabricated steel building is de-

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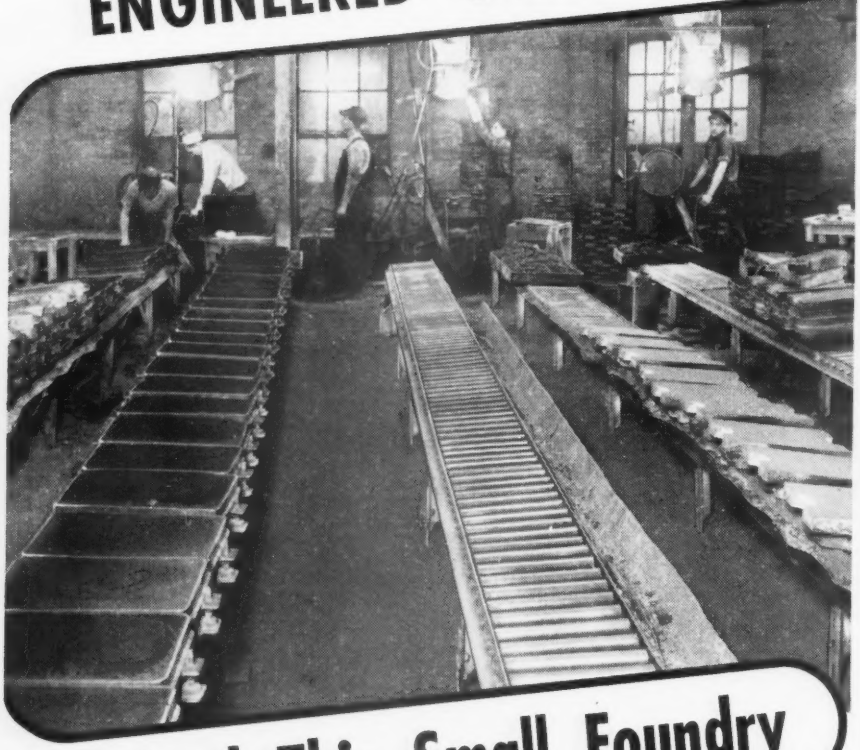

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ILLUSTRATING how the operation of a small plant can be made *more* efficient through the installation of an A-F *Engineered* Conveying System, this small Ohio foundry was able to easily increase its production 40% without increasing its floor space.

In small foundries especially, efficient operation makes the big difference between loss—and profit! But no matter how small or how large *your* foundry may be, you too can boost your production and reduce costs with an A-F *Engineered* Conveying System. Just think of being able to re-use sand four, five or more times a day, of re-using flasks many more times a day, and of improving the quality of your product while reducing rejects and breakage!

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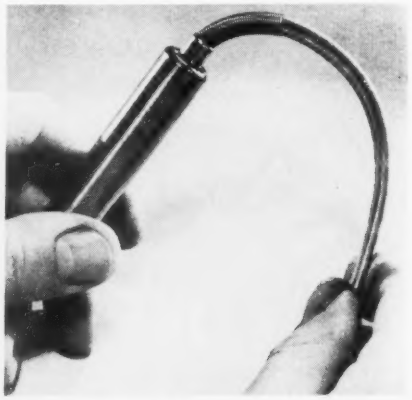
signed on the principle of the arch. A building is composed of large steel sheets, small steel sheets and a uniform sized nut and bolt. The steel sheets are merely fastened together with the nuts and bolts to make individual self-supporting arches.

For More Details Circle No. 30—Page 251

Spring Strain Relief: Edwin L. Wiegand Co., 7500 Thomas Blvd., Pittsburgh 8, Pa.—Protective spring strain relief is reported to protect electric cartridge heating units from



premature lead wire breakage. A high - tensile spring mechanically locked to the cartridge heating unit supports the lead wire and prevents sharp twists from breaking it. The spring strain relief is claimed to increase operating life of the lead up to ten times. It is not affected by heat and retains flexibility under all operating conditions. The manufacturer's electric cartridge heating units equipped with the relief device are supplied in 3/8, 1/2, 5/8 and 3/4-in. diam and in the usual lengths and wattages as standard heaters of these diameters.

For More Details Circle No. 31—Page 251

Chain Blocks: Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore Inc., Muskegon, Mich.—Lightweight, portable chain blocks of 3, 4, 5, 6, 8 and 10-ton capacities are for applications where low headroom and portability are essential. Frame and covers are made from aluminum alloy, upper hook suspension arm is cast integrally with frame, and both hooks are of the nonfracturing type that opens slowly under extreme overloads. Nongagging four-pocket lift wheel is totally enclosed by a floating chain guide to permit operation in any position.

For More Details Circle No. 32—Page 251

Air and Oil Cylinders: Tomkins-Johnson Co., Jackson, Mich.—Air and oil cylinders for a wide range of industrial applications are said to operate for long periods of time with little wear and no service requirements. They reportedly re-

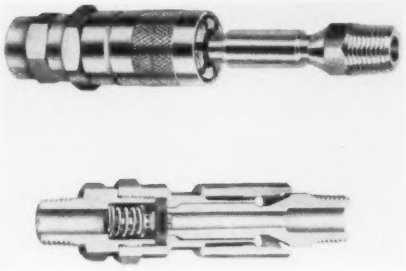
sult in a complete shutoff of air or oil and assure smooth cushioning with automatic valve action for fast return stroke. Streamlined design which eliminates tie rods and reduces head sizes is said to save up to 40 per cent in mounting space. Other features include hard chrome-plated bodies and piston rods, solid steel heads, heavy wall seamless steel body, leakproof construction and an extra-high safety factor. They are suitable for air pressures up to 200 psi and for oil pressures up to 750 psi.

For More Details Circle No. 33—Page 251

Safety Control: Femco Inc., Irwin, Pa.—Electronic control safety device permits workers to attend to a disabled crane without danger from other cranes approaching on the same runway. System automatically gives warning of the approach or shuts off the movement of an oncoming crane. Distance at which the shut-off is operative is adjustable from 1 to 20 ft.

For More Details Circle No. 34—Page 251

Quick Coupling: R. S. Corcoran Co., P. O. Box 1404, Joliet, Ill.—Coupling uses a modified collet principle for instant locking and unlocking. When engaged the coupling is free to swivel yet has 80 per cent of the plug shoulder in complete contact with the collet fingers. Stock couplings are available in single valve construction with many styles of threaded ends and hose attachments. Double valve and straight-through couplers are available on special order.

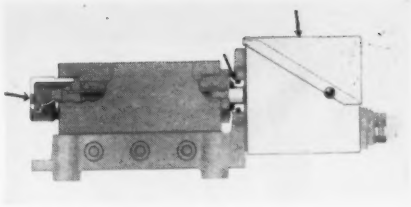


For More Details Circle No. 35—Page 251

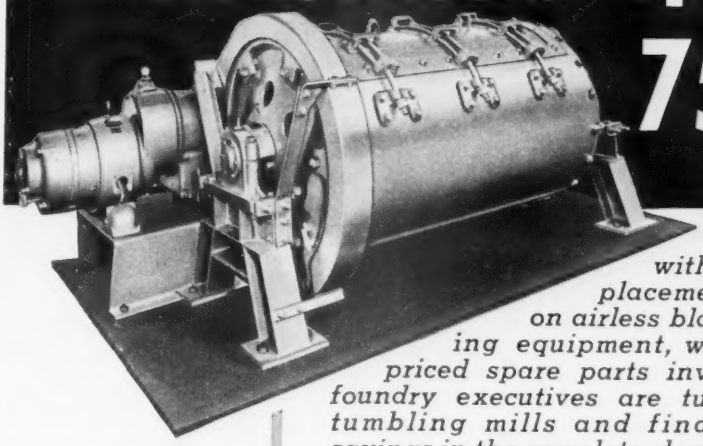
Reset Timer: Automatic Temperature Control Co., 5200 Pulaski Ave., Philadelphia 44, Pa.—Automatic reset timer with dial setting times and sequences electrical load circuits on machinery and process operations. Wide range of applications listed by the manufacturer ranges from vacuum metalizing, die casting, injection molding, sand mulling, grinding and motor starting to conveyor systems and temperature programming. Timer has one-piece acrylic front piece which serves as dustproof cover and dial seal. Expansion nut assembly fastens cover securely from rear surface and simplifies removal of dial. Large, knurled adjusting knob and integral time setting pointer are unitized part of dial and cover assembly.

For More Details Circle No. 36—Page 251

Solenoid Valves: C. B. Hunt & Son Inc., Salem, O.—Changes in the firm's "O"-type solenoid valves are said to protect all operating parts effectively from the entrance of dust and grit. A sintered bronze filter now is provided in the breather hole of the spring cap. This filter permits air to pass through in either direction but prevents entrance of dust and grit. In addition, a sleeve sealed with "O" rings at two places prevents foreign material from entering the area where the solenoid armature contacts the valve plunger. The top half of the new two-piece



CLEANING COSTS SLASHED up to 75%



Fed up with high replacement costs on airless blast cleaning equipment, with high priced spare parts inventories, foundry executives are turning to tumbling mills and finding big savings in the complete cleaning that results.

SLY TUMBLING MILLS

Clean thoroughly, and save hours and hours of grinding time by *eliminating fins as they clean.*

Clean all castings at once — no individual handling of pieces.

Do a perfect job on shell molded castings where surfaces need improving.

Permit use of unskilled labor during an evening shift or after shakeout, using the shakeout gang to load and unload the mills.

Save time by loading castings *red hot,* right from the shakeout. No other cleaning method can do this.

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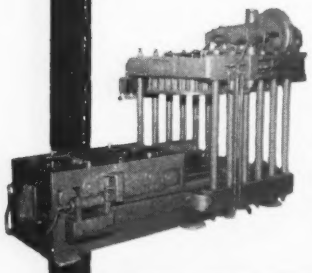

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Cupoline Ladle Mix

Many of today's accepted foundry practices such as synthetic sand, southern bentonite, chemical sand additives, cupola "gun patching" and pressure and diaform molding stem from *Eastern Clay's* pioneering, research and developments in materials, equipment and methods.

You can get from *Eastern Clay* this wide variety of materials and equipment plus modern technical know-how on improved operating efficiencies and the production of finer quality castings.

So call your *Eastern Clay* representative. You'll get prompt, understanding and helpful cooperation.

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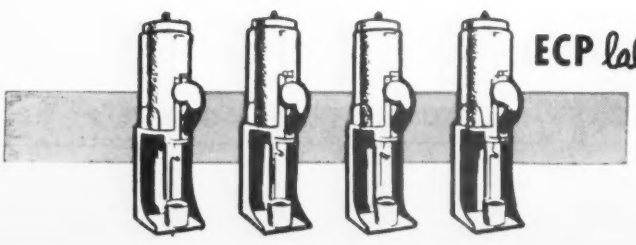

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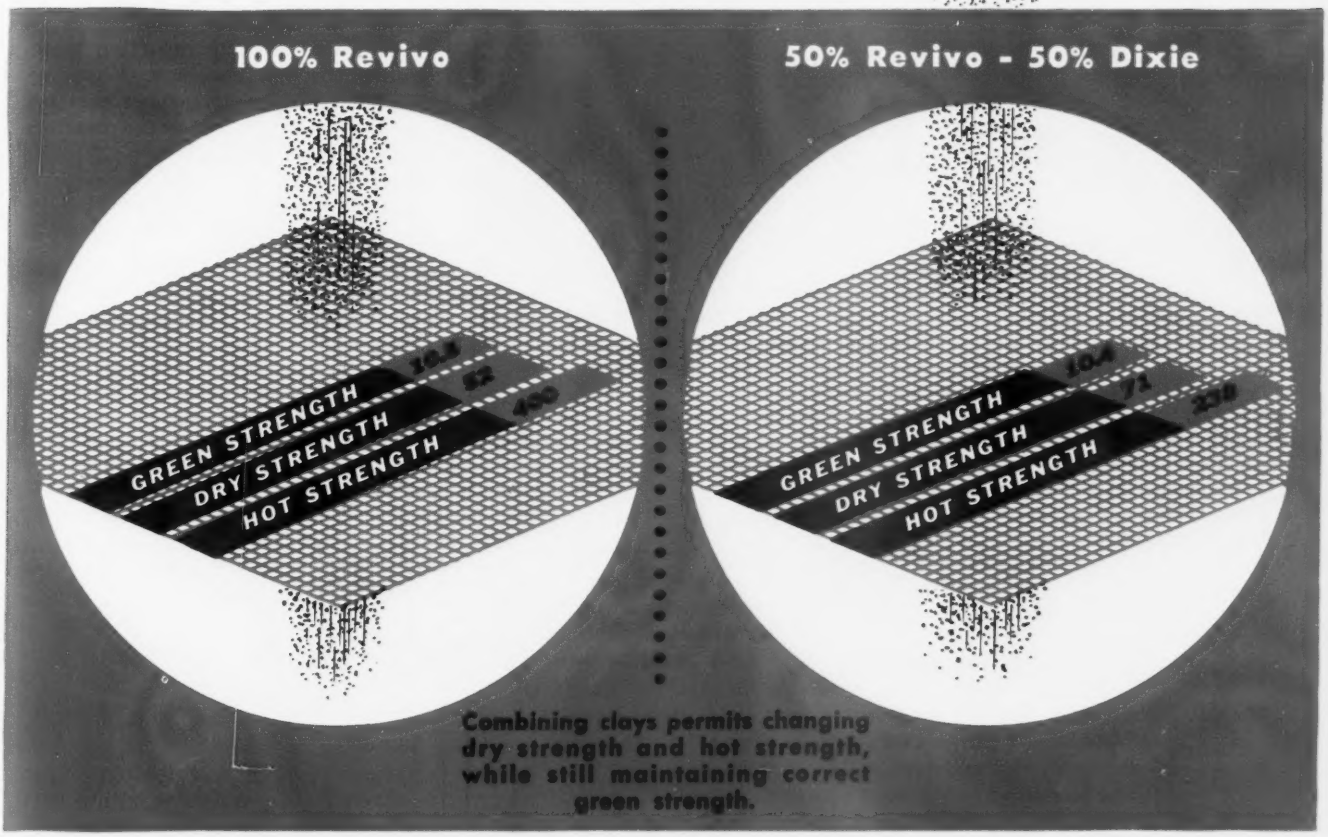
In addition to our own laboratories, four in number, we carry on tests constantly at universities, research institutes and private laboratories. Quality is dependably uniform from car to car.

REVIVO BOND and its combinations

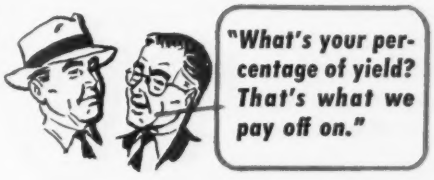
help increase your foundry yield



Combining clays permits changing dry strength and hot strength, while still maintaining correct green strength.

Correct combinations of quality clays reduce scrap and increase yield

Because Revivo is the most durable bond clay marketed to foundrymen today, it is an ideal base for combination with Black Hills Bentonite and/or Dixie Bond. Because Revivo has the highest strength of all the fire clay binders, you require less of it and yet obtain maximum permeability. Its high purity and maximum refractoriness reduce sand defects. . . In short, rely on Revivo to give you maximum durability, minimum scrap and maximum *yield*.



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And here's why! When sprayed on green or dry sand molds, cores, chills, matchplates, sprues or inserts, PARASPRAY provides a tough, moistureproof surface that completely *stabilizes* moisture content. The result—moisture content is held inactive with absolutely no loss, no gain. Molds retain their full strength, can be safely stored for days before pouring. PARASPRAY saves time, too, because it dries within seconds after application. It prevents washes, creates a deoxidized atmosphere, stops "burn-ins" with a thin carbon film formed between sand and metal.

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cover for the solenoid overlaps and fits tightly over the bottom half of the cover.

For More Details Circle No. 37—Page 251

Bridge Cranes: Philadelphia Tramrail Co., 3420 North Weikel St., Philadelphia 34, Pa.—Fluid drive on new series of bridge cranes is said to reduce wear on moving parts and protect motors and cranes from extreme shock. All motors are totally enclosed, high-torque, ball-bearing units equipped for alternating or direct current. Gear reduction is obtained through use of a double reduction helical gear reducer equipped with Timken tapered roller bearings on all shafts. Pinions are induction hardened and lapped with gears for smooth, quiet operation. Reducer efficiency is reported to be 96 to 98 per cent. Braking is accomplished by a quick-acting, electric solenoid shoe-type, spring-actuated brake.

For More Details Circle No. 38—Page 251

Exhaust Valve: Air-Mite Devices Inc., 4417 West Carroll Ave., Chicago, Ill.—Exhaust valve is said to increase efficiency and operating speed of air cylinders by providing fast venting of air from the return

side. Faster return strokes and more strokes per minute result when the valve is connected to the circuit, according to the manufacturer. Installation can be made at the cylinder outlet. Valve is available with ⅜-in. pipe ports.

For More Details Circle No. 39—Page 251

Booster Ovens: Jensen Specialties Inc., 9331 Freeland Ave., Detroit 27, Mich.—Booster ovens for installation ahead of present oven equipment serve as heat-up stage to bring products to temperature while allowing existing equipment to perform baking, drying, curing, or preheating job, but in a shorter time. Ovens reportedly feature standard size panels to meet various speci-

fications established by existing equipment and are adaptable to all types of ovens. Each panel uses metal-sheathed resistance electric heater rods as heat source. Rods are of variable intensity to satisfy a wide range of temperature requirements.
For More Details Circle No. 40—Page 251

Truck Crane: Hoisters Inc., 1913 Broadway, Kansas City, Mo.—Truck crane can handle 1000-lb loads within a radius of 8 ft from the crane. Loads can be stopped at any height by an automatic braking mechanism. Boom swings 360 degrees and revolves on hardened steel rollers and

a thrust bearing plate. Power unit is mounted in the base to simplify installation and service. Base plate requires an 18 x 23-in. mounting surface. Installation requires drilling of five holes and connection of electric cables to truck battery.
For More Details Circle No. 41—Page 251

Booster Pumps: F. J. Stokes Machine Co., 5500 Tabor Rd., Philadelphia 20, Pa.—Booster pumps are said to provide greatly increased throughputs in pressure range from 10 to 500 microns, the range at which many production scale vacuum processes, including vacuum melting and casting, are carried out. These processes call for evacuation of large volumes of air in addition to outgassing from the molten metal. The 16-in. pump has a throughput of 205,000 micron cubic feet at a pressure of 100 microns, with a forepressure tolerance of 2200 microns. At 500-micron pressure, throughput is 440,000 micron cfm with forepressure tolerance of 1600 microns. Comparably high throughputs are obtained with the smaller pumps, according to the manufacturer.
For More Details Circle No. 42—Page 251

Air Motor: Keller Tool Division, Gardner-Denver Co., Grand Haven, Mich.—Vane-type air motor features compact construction and high power output. It is available in five styles with center spindle gear case and in three styles with off-center spindle gear case. Developing 1 hp, the center spindle style is less than 13 in. long and 3¼ in. in diam.

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It's the sharply cut "thread stem" design that insures instant fusing. Metal melts at the edges first, that's why the sharp edges "burn in" quickly and completely to insure instant fusing which results in freedom from leakers. As the fusing cycle slows up through the base of the thread and into the stem itself, there is ample time for adequate and proper core support. Here is a design where fusion takes place at exactly the right speed to give you both instant fusion plus proper core support.

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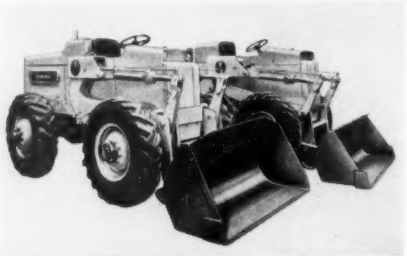
The offset style is less than 15 in. long and maximum diameter is less than 4½ in. Designed for continuous duty, the unit reportedly can provide quick starts and stops without overheating. It can take repeated or extended stalling without burning out and is nonsparking. The speed is variable throughout the entire range, from zero to full speed, and control is by a simple air valve.

For More Details Circle No. 43—Page 251

Tractor-Shovels: Frank G. Hough Co., Libertyville, Ill.—Two four-wheel-drive tractor-shovels which are of 1 and 1½ cu yd heaped capacities, respectively, permit 40 degrees of bucket "breakout" at



ground level instead of at a 3 or 4-ft carry position. Breakout pads on the ground serve as a fulcrum for leverage in providing action to obtain maximum loads. This transfers opposing load forces to the ground instead of to axle, wheels and hydraulic system. Underslung boom arm design and positioning provides driver visibility and safety. Hydraulic system is sealed and pressurized. Torque converters and full reversing transmissions, double-acting hydraulic rams with chrome plated piston rods, hydraulic brakes and power steering are standard on both models.

For More Details Circle No. 44—Page 251

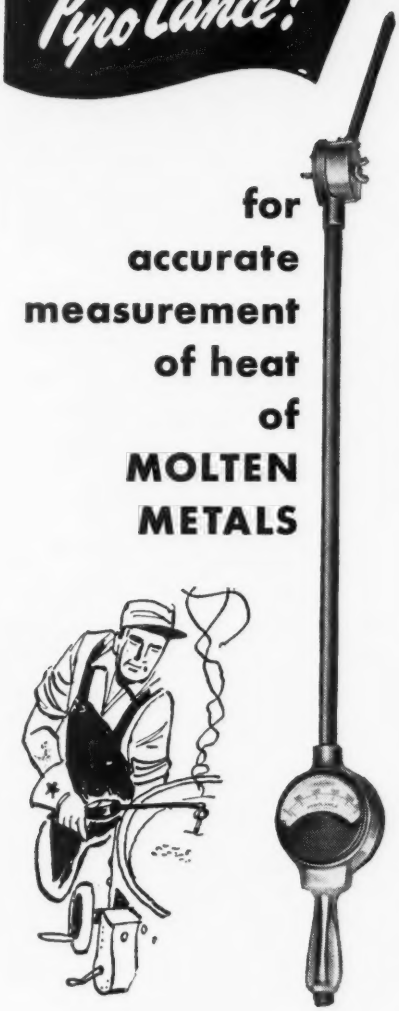
Radiant Gas Heater: Perfection Stove Co., 7609 Platt Ave., Cleveland 4, O.——Infra-red radiant gas heater reportedly operates on any kind of gas—manufactured, natural or liquefied petroleum, and has applications indoors or out. Unit heats instantly and reportedly directs heat over an area of 80 to 100 sq ft. It heats only objects that cross its rays and is claimed to be practical for use outdoors as well as in well-ventilated indoor space. Portable units can be supplied or permanent installations made with gas piped to the unit.

For More Details Circle No. 45—Page 251

Tailgate Loader: Converto Mfg. Co., Cambridge City, Ind.—Tailgate loader gets heavy loads into a truck quickly, safely and economically, the manufacturer reports. The assembly is mounted under the rear of the trucks and operates hydraulically,

Pyro Lance!

for accurate measurement of heat of MOLTEN METALS



For quick, accurate temperature readings of molten metals, operators of non-ferrous foundries everywhere are relying on the Alnor Pyro Lance. Portable, handy to use, the Pyro Lance has a protected thermocouple, with adjustable angle head, mounted in the lance tip. It takes temperature below the surface—unaffected by dross or other conditions. Here's an easily handled instrument to help control quality in the foundry. For complete information and prices on this valuable instrument write for Bulletin No. 1724-D. Illinois Testing Laboratories, Inc., Room 511, 420 N. LaSalle St., Chicago 10, Illinois.

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lifting operator and load to the truck bed level, then closing as a tailgate. Available in 2000 and 4000-lb capacities, the unit fits all 1½-ton and larger trucks without cutting or altering of cross-members and undercarriage.

For More Details Circle No. 46—Page 251

Electric Motors: Lima Electric Motor Co., 112 Findlay Rd., Lima, O.—Company is manufacturing a new line of industrial electric motors built to new NEMA standards. Important features of the alternating current motors include better protection, double-end ventilation, greater horsepower in a smaller package than before and decreased service demands. A lower air opening in the end-bell is combined with a steel baffle to give maximum protection to winding from moisture and abrasive dusts. Ventilation is provided by dual cast aluminum fans. Currently, all standard ratings are available in frame sizes 182, 184, 213 and 215. Balance of the line, up to and including 30-hp, is being processed. The company will continue to offer its regular line of NEMA frame sizes (66 through 505).

For More Details Circle No. 47—Page 251

DC Welder: Vickers Electric Division, Vickers Inc., 1815 Locust St., St. Louis 3, Mo.—Magnetic amplifier-rectifier dc welder is said to provide full-time automatic arc control under all conditions by automatically and continuously adjusting the selected arc characteristics to every change in welding condition. Control reportedly is made possible by a patented self-saturating magnetic amplifier with exclusive voltage-sensing, feed-back control circuits. Other features include downdraft cooling, separate duct-cooled reactor and transformer units, and sealed-in lubrication of fan motor bearings. Models of 200, 300 and 400 amp capacity are available.

For More Details Circle No. 48—Page 251

Recording Thermo Balance: Burrell Corp., 2223 Fifth Ave., Pittsburgh 19, Pa.—Thermo balance for laboratory technicians provides combined heating and weighing of materials under test and furnishes a continuous, permanent, visual pen record of all changes. Self-contained, the unit requires no auxiliary equipment. It is 15 in. wide x 18 in. deep x 48 in. high. Applications include gravimetric analysis; determination of moisture, volatiles and ash; carbon and sulphur determinations; and many others. The recording cycle can be changed to suit varying applications.

For More Details Circle No. 49—Page 251

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A complete range of sizes, standard or made-to-order.

CHILLED CAST IRON SHOT & GRIT

For tough cleaning jobs or surface finishing of heat-treated parts.

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Hi-strength reduces fracturing due to impact.

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Accident Prevention—The How and Why of It

By Nathan Saffren*

AS A RESULT of modern scientific and technological progress, life today has become very complex and diversified. With the enrichment of life, various problems have arisen of physiological and sociological natures, particularly those concerned with the health, safety and general well-being of the people in society.

Prominent among these problems is the rapid growth of accidents and the need of reducing them to an absolute minimum. The importance of accident prevention is being stressed today by various local, state and federal organizations. Safety at home, outdoors, on the highways and at work has become the concern not only of local fire, health and police departments, but also of various associations in industry, automobile clubs, fire underwriters, life insurance companies and other, similar groups.

To us who are employed in industry, safety at work necessarily becomes a subject of great concern and interest. It is my opinion that only through individual and group recognition of the need for accident prevention, through the assumption of responsibilities to concentrate efforts in following accepted and established safety rules and through simultaneous striving to improve safety conditions can advantages be derived that will benefit the individual, industry and society as a whole.

I would like to illustrate this point by using as an example the plant where I am employed. I believe that the lessons and principles of safety learned and practiced at our plant can be generally applied both to industry and society.

Co-operation Is Ideal Way

The ideal democratic way of action is co-operation of the union and company in industry, for such co-operation tends to produce a strong and healthy economy. A splendid example of such co-operation is the safety committee at our plant, comprised of representatives of the union and management. Here we find demonstrated the will of the working force and the company to recognize the need of accident prevention and to work together harmoniously to solve all safety problems as they arise by setting up a committee for that very purpose.

Ever since the safety committee came into being a few years ago, a high degree of safe operation has been achieved and maintained. Both worker and company have benefited, the company through increased production and profit, the worker through increased efficiency and improved morale and physical well-being. There has been a marked reduction in the number and character of accidents. In brief, our committee has done an outstanding and excellent job in accident prevention.

In examining the functions of the safety committee at our plant, one cannot but marvel at its broad scope and effectiveness. It does these things:

1. Formulates all safety plans and regulations and enforces them since it is empowered to take any disciplinary action it deems necessary.
2. Makes periodic inspections of the plant.
3. Consults workers as to the need

*This article won second prize in the 1954 safety letter contest conducted by the Malleable Founders' Society. Mr. Saffren works in the finishing department of the Buffalo plant of Acme Steel & Malleable Iron Works. He is a graduate of that city's Hutchinson Central High School and of the University of Buffalo.

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of any corrections in safety conditions (by eliminating all possible hazards, every effort is being made to create maximum safety in all departments).

4. Provides a rich and effective educational program to realize its goal of safety.

In addition, the safety committee educates the employees of our plant through these activities.

1. Publishing and furnishing literature on safety.

2. Showing movies and enacting plays dealing with the theme of safety.

3. Posting safety slogans and instructive displays throughout the plant.

4. Conducting a safety campaign through a safety contest.

5. Holding frequent meetings at which safety problems are discussed.

Through the educational program, the worker is being urged to be constantly alert—to think and act safely at all times. Plans are always being worked out for making everyone safety conscious. The safety committee has found that concrete safety results can be obtained by stimulating the interest and participation of the entire working body in a safety contest for which the plant is divided into several competitive teams and a prize is awarded the team establishing the best safety record.

Since all rules and regulations are made in the interest of the individual, the importance of the human element cannot be overlooked nor underestimated. Safety codes established by law and all the work of safety committees will prove futile unless the individual takes an active part in obeying all safety rules. He cannot and must not remain passive. He must recognize his own responsibility and make every effort to participate in accident prevention and, especially, as a plant employee, to co-operate with the safety committee. He should do the following:

1. Endeavor to be alert at all times.
2. Familiarize himself with all phases of his work.
3. Follow the rules of safety that apply to his particular work.
4. Make suggestions for safety improvement.
5. Wear the properly prescribed work clothes.
6. Use proper and efficient tools in his work.
7. Report all unsafe conditions.

Thus, through the co-operation of the individual with the safety committee, great strides have been made in safety promotion. The worker is being educated to be safety conscious in all his activities at all times, and safe and favorable working conditions are being brought about. The application of these principles to the community as a whole is therefore essential.

America today is blessed with material as well as spiritual wealth. A strong and secure America will guarantee the perpetuation of these treasured possessions. The adoption of safety measures in all walks of life and every phase of activity is a necessary element in the preservation of such security and of our American way of life.

Industrial Heating Engineers Receive Trinks Award

The Trinks Industrial Heating Award has been made to three engineer-executives in the field who have made important contributions to the science of industrial heating and to its application in national defense. Presentations were made at a banquet sponsored by the award committee at the University Club, Pittsburgh.

Recipients honored were Horace Drever, president, Drever Co., Bethayres, Pa.; C. E. Hawke, vice president, Carborundum Co., Niagara Falls, N. Y.; and Walter H. Holcroft, executive vice president and technical director, Holcroft & Co., Detroit. Mr. Drever was honored for his development of many original and improved furnace designs, Mr. Hawke as a pioneer developer of super refractories and Mr. Holcroft for his contribution to the science of gas carburizing and carbo-nitriding.

The award is bestowed annually for outstanding contributions to industrial heating. It was established in honor of Dr. Willibald Trinks, professor emeritus of Carnegie Institute of Technology and a world authority on industrial heating problems.

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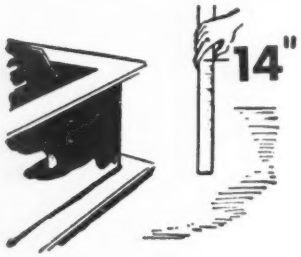

Space is saved and installation under floor or overhead is made easy by low height averaging less than 14" except where shaker is mounted.

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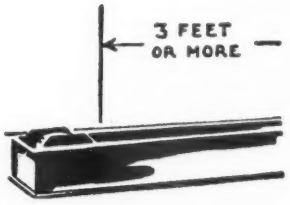

Ajax Lo-Veyors are made in lengths from 3 ft. up. They can be used for short "feeder" runs and for long carries with two or more units in series.

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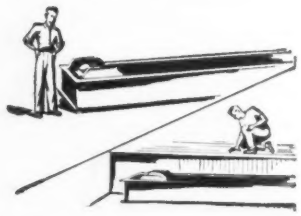

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Ajax Lo-Veyors are perfectly simple and simply perfect for foundry conditions. The principle of design and construction of Ajax Lo-Veyors contributes to low power requirements. The reciprocating drive is in automatic balance. Entire conveyor pan and drive floats on springs and is not dependent on heavy anchorage to building for application of drive force. Materials can be scaled or sized while being conveyed. Thus, one Ajax Lo-Veyor performs two operations which ordinarily require two machines.

Ajax Lo-Veyors answer the exacting requirements of modern industry. Their performance record in thousands of installations, large and small, is proof of their adaptability and economy. They are made in a wide range of lengths, widths and capacities to fit every condition. Write for Ajax Lo-Veyor Bulletin No. 39.

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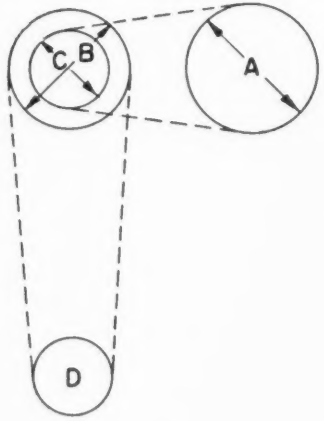
Diameters and Speeds of Driving and Driven Pulleys



Revolutions Per Minute on Driven Pulleys

The number of revolutions per minute of a driven pulley is equal to the product of the revolutions per minute of the driving pulley and the diameter of the driving pulley divided by the diameter of the driven pulley. Or where,

R = Revolutions per minute of the driven pulley.
n = Revolutions per minute of the driving pulley.
D = Diameter of the driven pulley.
d = Diameter of the driving pulley.

$$R = \frac{dn}{D}$$

Diameters of Driven Pulleys

The diameter of a driven pulley is equal to the product of the revolutions per minute of the driving pulley and the diameter of driving pulley divided by the revolutions per minute of driven pulley.

$$D = \frac{dn}{R}$$

Diameters of Driving Pulleys

The diameter of a driving pulley is equal to the product of the diameter of driven pulley and revolutions per minute of driven pulley divided by revolutions per minute of driving pulley.

$$d = \frac{DR}{n}$$

Revolutions Per Minute of Driving Pulley

The number of revolutions per minute of a driving pulley is equal to the product of the diameter of driven pulley and the revolutions per minute of driven pulley divided by the diameter of driving pulley.

$$n = \frac{DR}{d}$$

Revolutions Per Minute of Driven Pulley in Compound Drive

The number of revolutions per minute of the second driven pulley is equal to the product of the revolutions of the first driving pulley and the quotient obtained by dividing the product of diameters of driving pulleys by the product of diameters of driven pulleys. Or where,

A and B = Diameters of the driving pulleys.
C and D = Diameters of the driven pulleys.
N = Revolutions per minute of second driven pulley.
n = Revolutions per minute of first driving pulley.

$$N = \frac{nAB}{CD}$$

Pulley Diameters in Compound Drive

Place the revolutions per minute of the driving pulley as the numerator of a fraction and the revolutions per minute of the driven pulley as the denominator, and reduce this fraction to its lowest terms. Then resolve both numerator and denominator into two factors and multiply each pair of factors (that is one in the denominator and one in the numerator) by a number which will give pulleys of large enough diameter.

Example: The number of revolutions per minute of A = 320 per minute.
The number of revolutions per minute of D = 900 per minute.

$$\text{Fraction} = \frac{320}{900} = \frac{16}{45} \text{ resolve into factors } \frac{8 \times 2}{9 \times 5}$$

$$\text{Multiplying pairs by same numbers} = \frac{(8 \times 1) \times (2 \times 4)}{(9 \times 1) \times (5 \times 4)}$$

$$\text{or } \frac{8 \times 8}{9 \times 20}$$

∴ 8 and 8 are diameters of driven pulleys C and D and 9 and 20 are diameters of driving pulleys.

Procedure for Making Castings of Uniform Thickness from Block Patterns

The accompanying illustrations show a reliable method for producing castings of uniform thickness from solid patterns. The method may be applied to open work, such as heating-stove tops, or to solid work, such as the oven doors of cooking ranges.

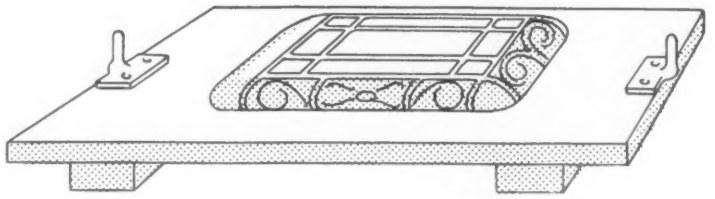
The first step is to make a wood pattern of the shape and form desired. The face of this pattern is the same as that of a loose pattern of like design. At the back, however, the pattern is not hollowed out. This pattern is attached solidly to a board, as shown in the upper view. This board is fitted with pins that fit the drag with which it is to be used.

When molding by this method, the drag is clamped to the board and the sand is rammed hard. This point is important and should not be overlooked. The pattern is drawn in the usual way.

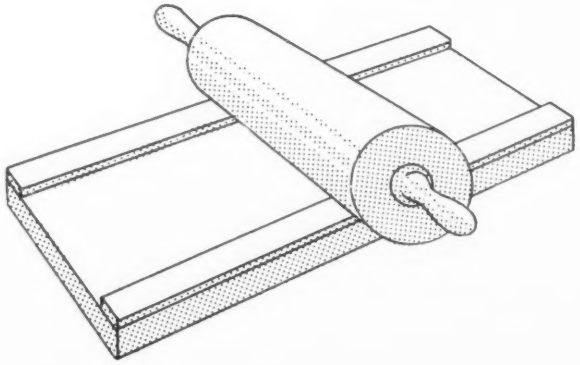
The thickness of the casting section is determined by the thickness of the clay that is used in molding process. The clay is rolled out in sheets with an ordinary rolling pin, on a board having wood strips on its sides. These strips are the same thickness as the section desired in the casting. The board is shown in the lower view. It should be approximately 18 inches long and 6 inches wide while the strips can be of 1-inch material and of the same thickness as the casting section.

The mold is next lined with strips of clay cut from a sheet that is rolled out on the board described. This results in a lining of clay of a uniform thickness in the drag. The cope is rammed in the usual way, gated and vented and set aside. The clay is removed, the drag is shaken out and a new drag is made on the pattern board, as would be done in ordinary practice. The mold then is closed and is ready for pouring.

Potter's clay gives good results in molds of this kind. It should be tempered with water until firm enough to handle conveniently and preferably be dusted with facing before rolling out on the board. It is also advantageous to varnish the rolling pin and the clay board as this prevents the clay from adhering.



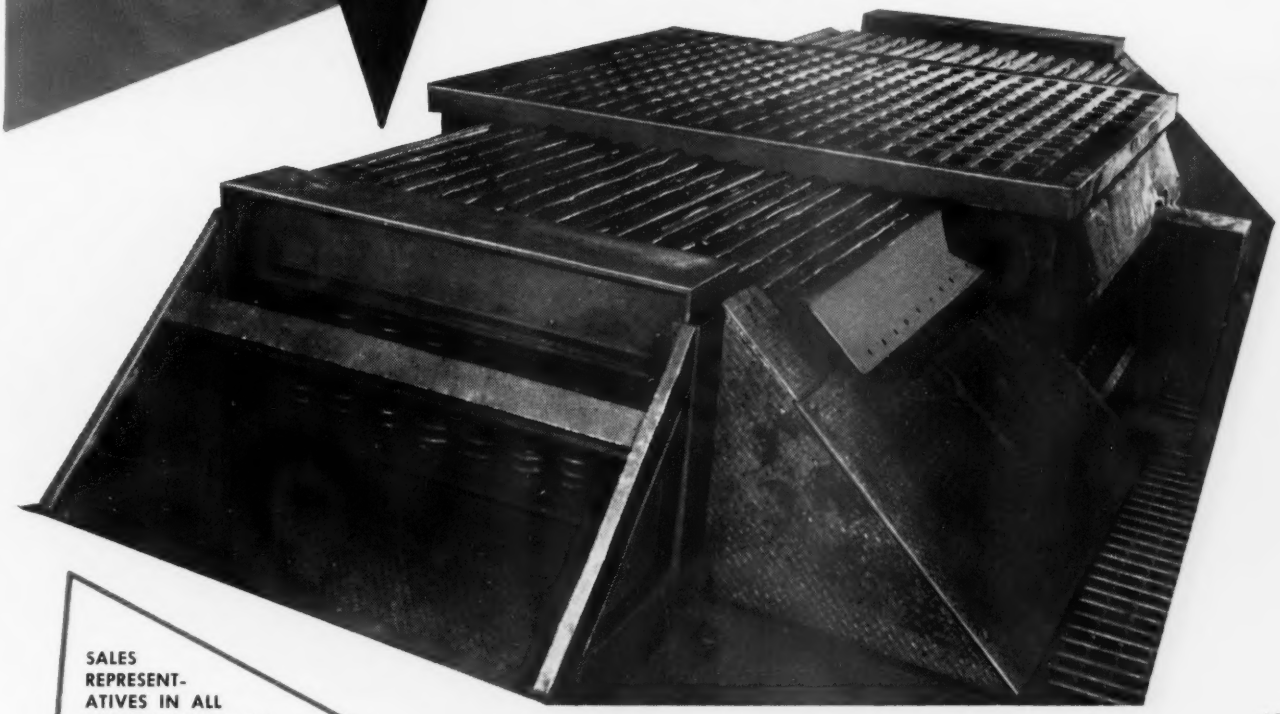
Solid block pattern attached to mounting board



Strips on side of board determine thickness of clay

Simplicity spring mounted shake-outs handle big flasks with ease at Beloit Foundry Company in Wisconsin

Installed at the Beloit Foundry Company, Beloit, Wisconsin, this Simplicity Shake-Out arrangement can handle big flasks ranging up to 75 tons regardless of the length or shape of the castings being shaken out. The center of the installation is a Simplicity 10′ x 12′ spring mounted shake-out which is one of the biggest single units in operation today. Prior to the installation of this shake-out, a Simplicity 8′ x 10′ Dual was used. By splitting the Dual and installing the new model between them, Beloit Foundry was able to get 200 sq. feet of useable shake-out surface. A combination of Positive Vertical Action with controlled throw, rugged body construction, and a massive 6′ Ductile Iron (nodular iron) deck which was cast by the Beloit Foundry Company, makes shake-out speedy and thorough without the danger of castings feeding off or bouncing off the deck. For handling heavy concentrated loads ranging up to 200 tons maximum, the Simplicity Spring Mounted Shake-Out is unequaled. If you're pouring really big castings it will pay you to call in your Simplicity sales engineer and let him give you all the facts on Simplicity Shake-Outs and other foundry equipment.



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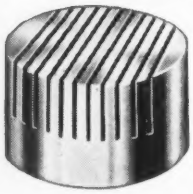
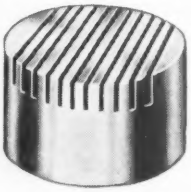
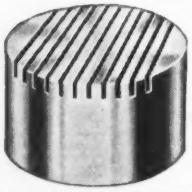


X-TRA DEEP HEAD .156 Wide Slots .014

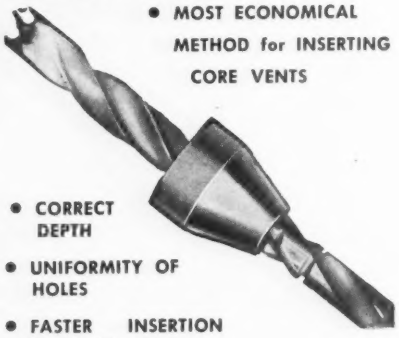


DEEP HEAD .093 Wide or Narrow Slots .014 .010



SHALLOW HEAD .031 Wide or Narrow Slots .014 .010

INSERTING DRILL



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THIS IS MY LIFE

By A. Casting*

YOU probably think that your life doesn't resemble mine, but you are wrong. You probably began as a gleam in your father's eye, and I started as a dream in an engineer's mind.

You probably also think that only humans have a long battle to survive hardships, setbacks and abuse. Again, you are wrong.

For months I was no more than faraway thoughts, but at last one day I became an idea. The weeks that followed were at times almost unbearable, but they were only the beginning. I was scribbled, erased, marked out, torn to bits and thrown away until I felt that if I furnished one more piece of wastebasket material, I would die before I was born.

On a bright, sunshiny morning, however, when my engineer had a clear mind and smogfree eyes, he drew me again. This time he rushed me into the office of some other men —more engineers. The next few days were wonderful. I was carried about with great care and protected from all outside contact. At night, I was locked carefully in a file. Those few days were perfect, and I believe that I would never have been able to face my future if it had not been for this period of tender care. But my happiness did not last long. Suddenly one morning I was taken from my file and mailed off to another city, far away.

Only the Beginning—When I arrived there, the hands that touched me felt greedy, and the mere touch made my delicate blue paper crumble with fear. From these greedy men's conversation I learned that I wasn't even born yet. The person who drew me was only the first step in my life, and I shall never forgive him for not letting me know it. I also feel that as far as he was concerned, I was complete. I never heard him mention how I would work out beyond the blueprint stage.

At last I got a price on my head. The men who had scribbled and figured on me rushed a telegram back to my home town quoting what it would cost them to manufacture the equipment to give me birth. They were given the job.

Immediately I was rushed into the hands of more engineers. This time

*This amusing work was sent to the editors by Dale S. Richins, Aerojet-General Corp., Azusa, Calif., who was given a copy during a visit to a Los Angeles foundry. The author is Elvan Ward, a young lady with a sense of humor who is the head of the office force in a California foundry.

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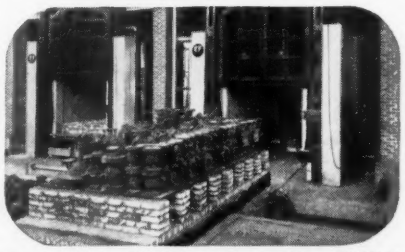
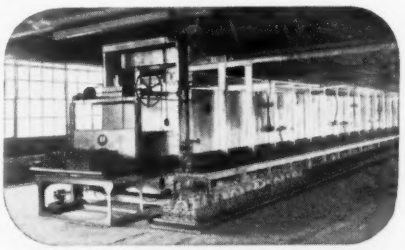


EF DOUBLE CHAMBER CAR TYPE FURNACE for annealing castings, equipped with three furnace cars and one transfer car incorporating car puller. Built by The Electric Furnace Co., Salem, Ohio.



EF ELECTRICALLY HEATED CONTINUOUS ROLLER HEARTH FURNACE for the scale-free annealing of various iron alloy castings in special atmosphere. Built by The Electric Furnace Co., Salem, Ohio.

EIGHT EF FUEL-FIRED BATCH TYPE FURNACES, showing gantry crane that handles the large, heavy castings into and out of the furnace and quenching equipment. Built by The Electric Furnace Co., Salem, Ohio.

BULLETIN No. 461
shows typical installations of EF Gas-fired, Oil-fired and Electric Furnaces
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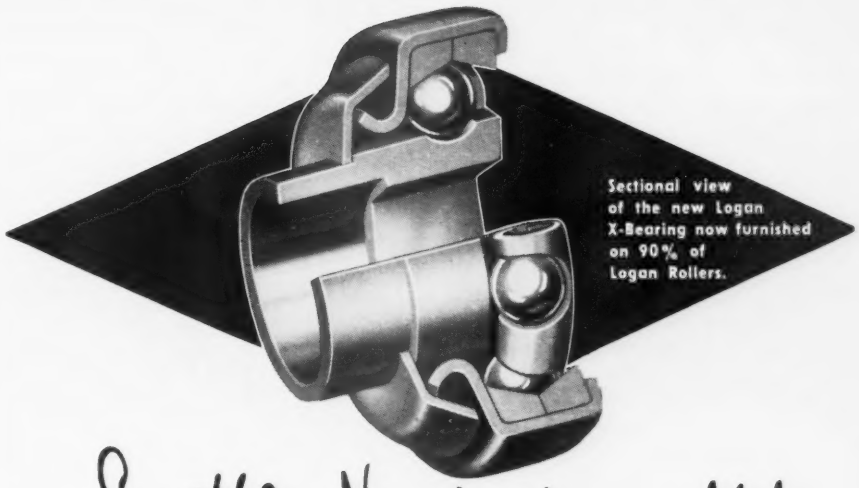
I knew the next few days would not be easy for me. However, everyone seemed in a mad rush to have me completed. Before long the equipment was finished. They called my mother a "permanent mold," and again I learned something. I was to have brothers and sisters. On the day I was born, huge pots of aluminum were heated, and men dipped into the pot and poured the hot metal into my mother. Shortly I was born.

Everyone rushed about, and someone called an "x-ray technician" carted me off to a dark room and took my picture. Then men read the film and were overjoyed. I was perfect! Next, someone else grabbed me, took me to a huge saw and started sawing me apart. I was shaking with fright and could not understand why I felt no pain. I learned it was not a part of me that was sawed off. It was something called "gates and risers."

Next the Heat Treater—I was under the impression that I was manufactured to be of service in a plane and would be of utmost importance. The paperwork covering me stated so. Evidently my paperwork did not go with me at all times. I was sent to a "heat treater," and he must have thought I was manufactured just for him to heat treat. He threw me around until I became warped from his abuse, but he didn't seem to mind. I saw him putting another price on my head, but this bill went to my owner, the people who had my mother.

If only I could have told them about the treatment he gave me, I am sure they would have demanded a refund. But instead of questioning his service, they swore at me, pounded me with a hammer and stretched me. The hours following were something I hope no human ever encounters, but at last they said I "fitted the fixture." Again, I felt proud of myself. I soon found, however, that that was not the end. They packaged me up and sent me back to my home town, along with a shipper that said I was a "dimensional sample" and "If accepted, return for further inspection." I was becoming skeptical and dreaded my future.

When I arrived back home, I was taken into the office of my original engineer. There, I thought, was someone who would be glad to see me—my engineer, the one who had drawn me. But he looked me over with cold eyes. Men checked, rechecked, drew and laid me out, all with the cold attitude that they had



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at no increase in price...

Typical installations which include Logan X-Bearings

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It costs no more to get conveyors equipped with the Logan X-Bearing . . . the new low friction, extra quiet bearing, with semi-precision construction. Also, this bearing is interchangeable with old style bearings and will be furnished on replacement orders. Logan is now standardizing on this high efficiency construction. Note: Less grade is required on gravity lines and the manual effort required has been correspondingly reduced on level push lines. Ideal results also obtained on belt and live roller conveyors through the use of X-Bearings. Write for Folder X-1.

LOGAN CO., 580 CABEL ST.
LOUISVILLE 6, KY.

Logan Conveyors now standardizing on the new X-BEARING

never seen me before. I think they actually tried to find something wrong with me. At last, they agreed that I was dimensionally acceptable.

The engineers filled out a piece of paper saying I was approved dimensionally. Signature after signature went on the paper. Everyone seemed afraid to take the responsibility for saying I was acceptable even that far. Finally, with the paper and all the signatures, they sent me back to my new owner and my permanent mold mother on an airplane. It seemed they were getting in a hurry for me, as well as for my brothers and sisters. I hoped that since they were anxious to get me, my treatment would be kinder.

Under the Spotlight—Upon my arrival, I was unpacked. While someone was unpacking me, someone else started heating up the huge pot of metal again, and from the conversation I gathered that my brothers and sisters were going to be born. I was taken into a dark room where oil was poured on me and I was put under a light. I looked pretty—fluorescent! The inspector seemed pleased and passed me along to the man who originally had taken me into the dark room. Since he had been nice, I didn't mind at all. I wasn't one bit afraid. But he didn't take me into the dark room. Instead he tagged me with another shipper and sent me to a certified x-ray laboratory.

My tag called for "100 per cent x-ray inspection," but since one person had already "shot" me, I felt secure. I reached the laboratory for my x-ray, and I found that people there thought I was manufactured just for them to x-ray. I don't know why all these people feel this way, but I wish someone would tell them otherwise.

They shot me from all angles. Once, when no one was looking, a fly landed on me and left its trademark. The film reader looked at the speck and his mouth watered, his pulse increased, and his eyes gleamed. I wanted to tell him to look closer, but of course I couldn't. Hence I was rejected. He hung a red tag on me and sent me back to my mother.

The people who had manufactured me were furious! After much conversation they decided to send me out for "blast cleaning." I did not know what it was, but I soon found out. After I returned, however, my morale was better, for at last I was an acceptable casting, except that I needed a tiny bit of grinding. I was given to a man and taken to the back of the shop. I felt wonderful. I was almost accepted!

That Man at the Wheel—When I reached the back of the shop, I saw stacks of my brothers and sisters. Then the man began to grind on me. Suddenly bedlam arose. My happiness was short lived. He had ground too much! My life ended, just as I had begun to live. They sawed me in two and threw me into the scrap barrel. If I had been given the chance to warn the rest of my family of the perils lying in wait for them, perhaps they could have prepared themselves for the shock and have withstood it all better than I. But each of us must find out for himself.

That's why I think you humans are stupid. You can talk with each other and explain the "why-fors" and the "why-nots," yet, given this chance, you go merrily along paying heed to no one. Why didn't my engineer mark certain sections of my body "Critical Area," or if he did, why didn't my manufacturer take heed? Why doesn't someone catch the guy who calls a fly speck a de-

51% SAVINGS IN WHEEL COSTS!

(says a Midwestern foundry)

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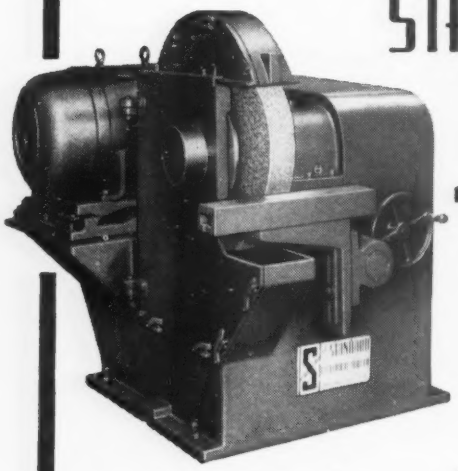

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Write for Catalog and Complete Details

fect? And why doesn't someone watch the heat treater and see the way he treats us?

Now I am being melted down into the huge pot, and I feel very bitter. This will be my only chance for revenge. I am a different alloy from the rest of the melt, but the fellow melting me down didn't catch the difference.

NFA Surveys Wages in The Foundry Industry

Results of a national wage survey in the foundry industry have been compiled and published by the National Foundry Association, 53 West Jackson Blvd., Chicago 4. Based on the Jan. 15, 1955, wage rates of 1164 foundries, the report covers 29 job classifications which were selected as basic occupations in the industry.

Data contained in the 52-page booklet also includes information on the types and sizes of the foundries reporting and on labor affiliations, benefits offered, vacation policies and paid holidays. The report is broken down into local and regional sections.

Book Review

Plastics Tooling, by M. Riley, cloth, 123 pages, 4¾ x 7 in., published by Reinhold Publishing Corp., 430 Park Ave., New York 22. Price $2.50.

Nontechnical discussion of the latest information is presented on resins and methods used in plastics tooling and its major applications to date. Discussion of the chemistry of plastic materials is limited to showing how their composition affects their use in tooling. Tooling resins, tool fabrication, fixtures, metal and plastic forming tools, die models and prototypes and experimental tools are covered.

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involving Parsons oval bag cloth arrestors, high efficiency Cyclones and Parclones, hydrostatic and Traugber wet collectors.

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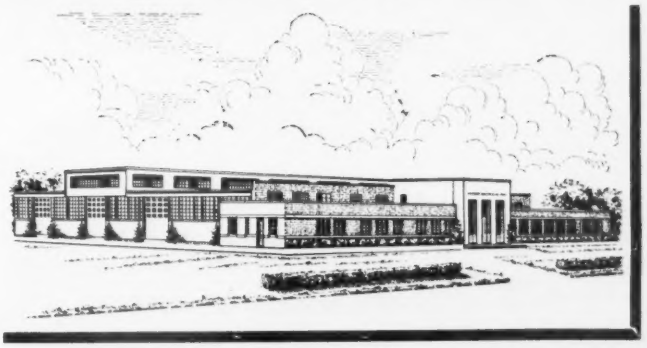
OUR NEW PLANT



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Write for Bulletin F-240

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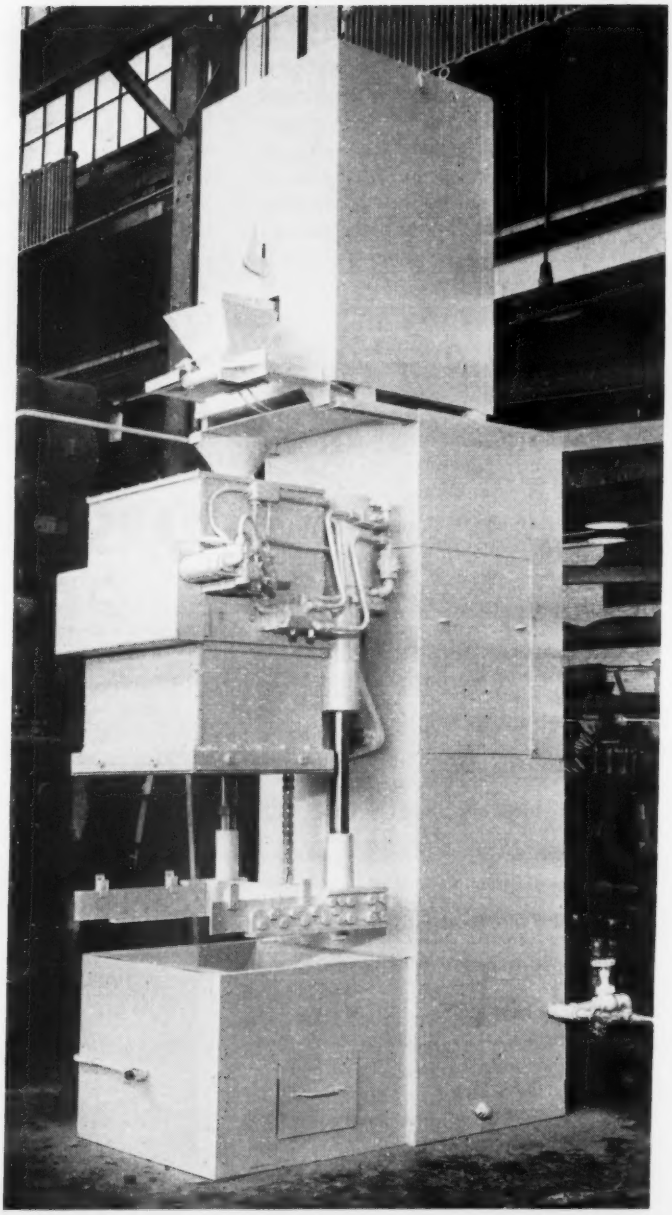
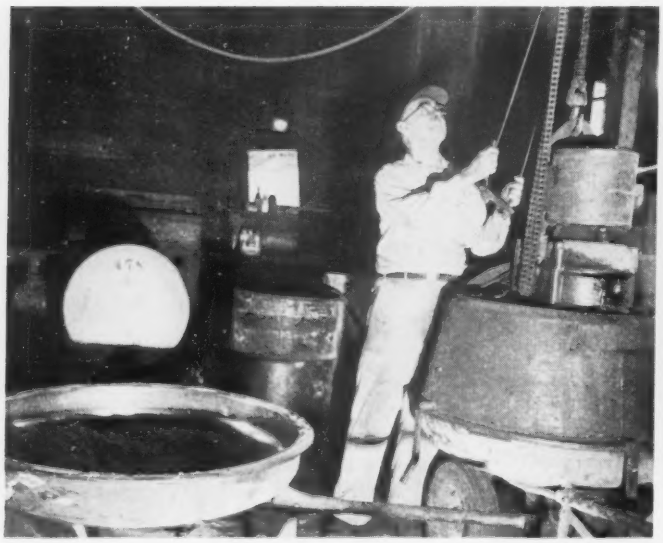
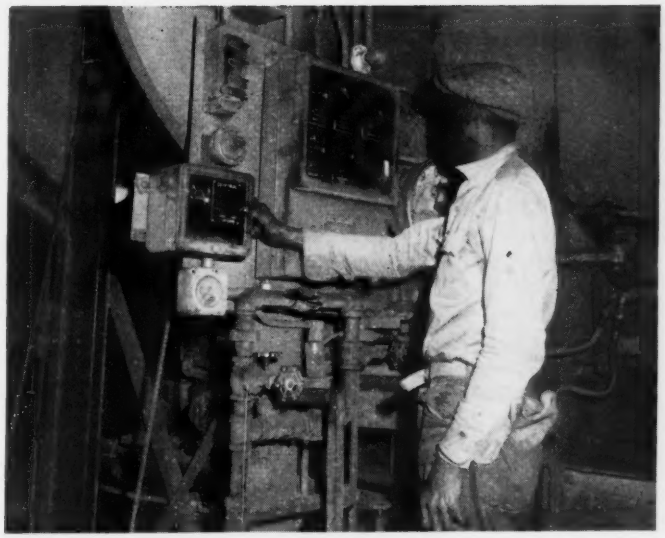


THIS FULLY AUTOMATIC SHELL INVESTMENT UNIT forms four or more perfect shells for patterns up to 24 x 30 inches in size each minute. It features precise investment time control, metered sand resin addition, controlled sand resin rainfall and thorough lamp scavenging. This shell investor may be installed individually and later combined in a complete rotary Formatic Unit. When installed individually and used with pattern dollies, it offers all of the control features so essential to shell molding. *Full information may be obtained by writing to Beardsley & Piper, 2424 N. Cicero, Chicago 39, Ill.*

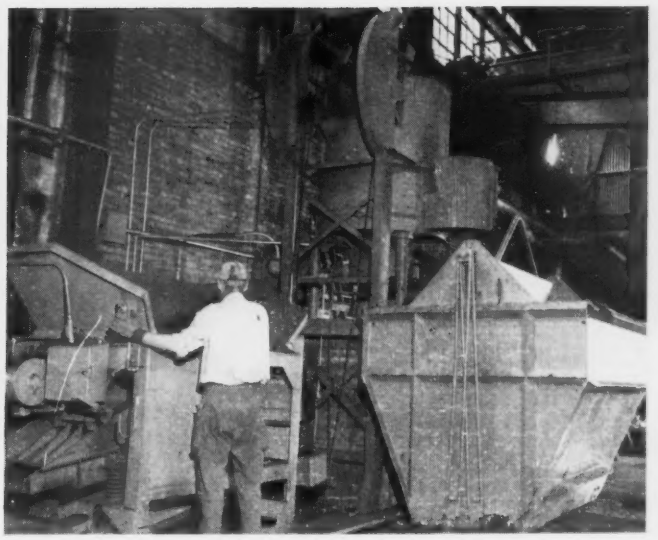


ALL OF THIS FOUNDRY'S CORE SAND is prepared in this Model 3½ Mulbaro. At the Riverside Foundry, Chicago, Illinois, three barrows are used with a single mulling mechanism permitting full utilization of the Mulbaro's capacity. *For full information write to Beardsley & Piper, 2424 N. Cicero, Chicago 39, Ill.*

IN ONE OF THE BEST small core rooms in the country . . . the Midwest Foundry at Coldwater, Michigan, blows a great variety of miscellaneous cores on B&P Champion Core Blowers. A powered conveyor belt handles the output from eight Champion Blowers. *For full data write to Beardsley & Piper, 2424 N. Cicero, Chicago 39, Ill.*

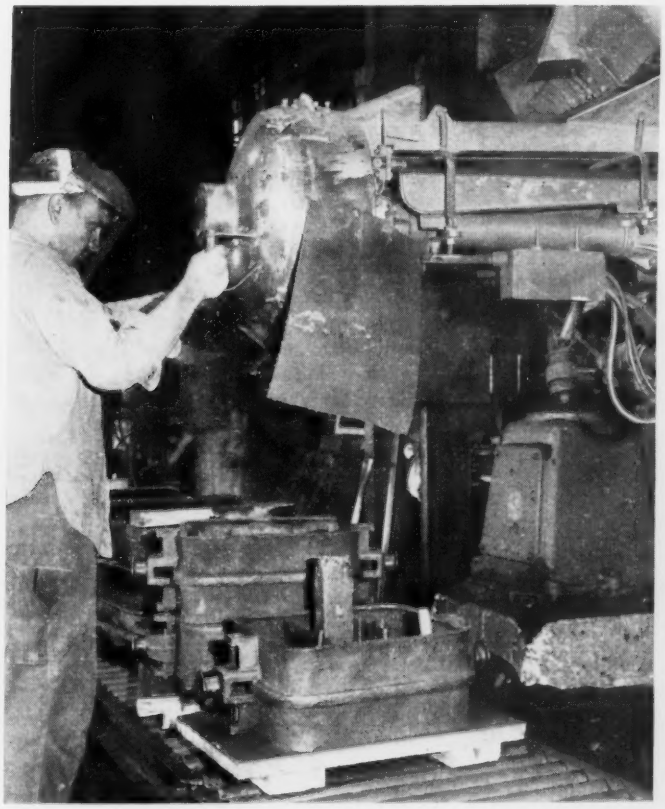


SKIPTROL CUTS COSTS in this gray iron foundry where two Skiptrol-equipped Speedmullor-Preparator units handle the preparation of molding sand. Skiptrol automatically controls the loading of the skiphoist bucket and stops the Preparator or loading belt when the bucket is full. *Full data may be obtained by writing to Beardsley & Piper, 2424 N. Cicero, Chicago 39, Ill.*



NO PITS were required for the installation of the new Model "60" Preparator which is a part of this "50-60" Speedmullor-Preparator unit at the Riverside Foundry, Chicago, Illinois. The "50" Speedmullor is platform-mounted to permit loading of the portable slinger tank at floor level. *Send for a free copy of the Riverside story; Beardsley & Piper, 2424 N. Cicero, Chicago 39, Ill.*

PERFECTLY RIDDLED CORE SAND is riddled directly onto the pattern by this B&P Roller Riddle at the Chemalloy Foundry, Louisiana, Missouri. The automatic Roller Riddle need only be positioned over the core box momentarily and the riddling job is completed. The core box is mounted on a J&J Jolt-Rol-A-Draw and the sand is Speedmullor-mulled. *Full data may be obtained by writing to Beardsley & Piper, 2424 N. Cicero, Chicago 39, Ill.*



THIS SANDSLINGER-CONVEYOR UNIT at the Lindgren Foundry, Batavia, Illinois, successfully handles the foundry's small and medium size work. With Slinger flexibility loose or mounted patterns of any height and of wood or metal construction may be handled with ease. A newly installed Speedmullor provides the mulled all-purpose sand for this operation. *Write for full information to Beardsley & Piper, 2424 N. Cicero, Chicago 39, Ill.*

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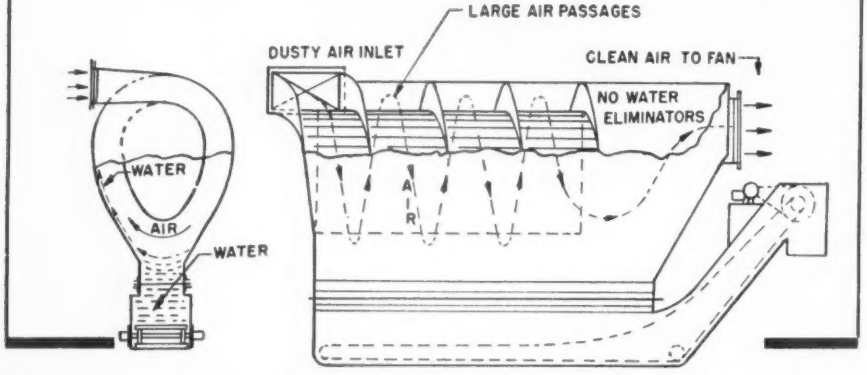

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Meditations of a Sandman

By HAROLD E. HENDERSON
H. C. Macaulay Foundry Co.
Berkeley, Calif.

"Crusader for Castings"

I HAVE suspected that someone might be reading this column, but until this morning I wasn't sure of it. The mailman just brought me a letter from my old friend, Bob Kennedy, who writes in his usually cheerful manner to say that my scribbling has brought back some memories of yesteryear, which evidently were not unpleasant.

Bob gave me little news of his own activities (innate modesty), but did speak with enthusiasm of an apprentice contest he had recently attended. The substance of his letter concerned the need for greater participation on the part of young men in the activities of the American Foundrymen's Society, a great part of which is the lengthened shadow of Bob Kennedy. Few men have done more than he to promote the progress of the industry they loved.

I believe it was Emerson who said that Providence never failed to provide the right man for a crucial job, and someone else said, "Happy is the man who loves his work!" Even in so-called retirement, Bob is still a crusader for the casting industry. Younger men may succeed him, but they will never take his place.

In my work, I frequently refer to Harry Dietert's book, *Modern Core Practices and Theories,* which I find most helpful. I never open this book without first turning to its dedication: "To Robert E. Kennedy—The man whose untiring effort has led the work of the many technical committees on molding materials and metals of The American Foundrymen's Association. His inspiring influence contributes much toward the advancement of the foundry industry. In appreciation, the author affectionately dedicates this volume." Bob has a host of friends who will say "Amen" to that.

Now if Bob should read the foregoing, as he probably will, I can almost see him scratching his head, wrinkling his brow, and asking,

PYRO
Instruments for precision temperature measurement

The Simplified
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The only completely self-contained and direct reading Optical Pyrometer for quick and accurate temperature measurements of molten iron, steel, monel, etc. No calibration charts or accessories required. Weighs only 3 lbs. PYRO will pay for itself many times over by helping prevent spoilage. Write for Catalog #85.

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Helps insure low-cost production of SOUND and UNIFORM non-ferrous castings. Withstands roughest handling. "Protected Type" and "Bare Metal" thermocouples instantly interchangeable. Equipped with exclusive LOCK SWIVEL. Stock ranges from 1000°F to 2500°F. Ask for Catalog #155.

THE PYROMETER INSTRUMENT COMPANY Inc.
Bergenfield 6, New Jersey, U. S. A.

"What is this guy buttering me up for? What does he want? Why this premature eulogy?"

Well, Bob, you may blush if you must, but I refuse to retract a word, for truth requires no apology.

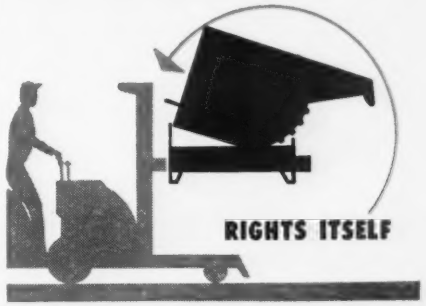
In the healthy growth of any organization, many men of many talents are necessary, each contributing according to his interest and capacity. In the foundry industry we probably find as diversified a group of men as exist anywhere. Every race, religion, and human type is represented. Every stage in the scale of mental development can be observed, from the very erudite of our great universities, to those who can neither read nor write. Yet each contributes in some measure to the advancement of the foundry industry. The laborer may not be a scholar, yet the scholar is more dependent upon the laborer than he might care to admit.

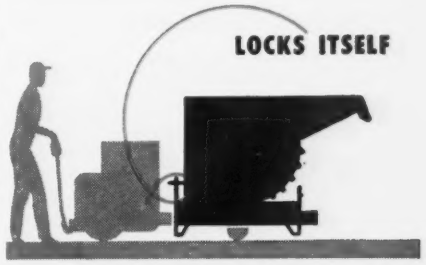
In sand practice, as in other things, we too frequently arrive at what appears to be a dead end, a problem which seemingly has no answer. All the latest technical literature and the most modern laboratory equipment are of no avail. Our immediate answer-defying problem appears to be unique in the annals of attempted sand control. It is then that we should turn to the past for help.

If you fortunately have preserved the AFS *Transactions* of 20, 30 or even 40 years ago, and perhaps a file of FOUNDRY going back even farther into the "screen and shovel" days—and in glancing over the yellowed indexes, you are intrigued by subject titles of a strangely modern flavor—then read on! You will enjoy a truly rewarding experience in perusing the thoughts of yesterday's foundrymen.

I am not recommending a return to the foundry practice of yesterday, but I do urge you to re-examine the history it produced. You may be surprised to learn that the oldtimers were not unmindful of many of the problems which still prove frustrating, and we should be grateful that they succeeded to a degree which has made our path much smoother.

The old-timer didn't talk about permeability, deformation, mold-wall movement, cushion, pH control, etc., but, despite terminology, he was fairly successful in taking care of these things. After all, our practice is largely a refinement of his. (He used horse-manure, stale beer, and molasses water; we prefer wood flour, various stabilizers, and soda ash.) His materials and equipment were crude by our standards, but they were effective within his com-





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Whether you do shell-mold casting, lost wax casting, or any other special type of foundry work, you can get the sand you need from WEDRON. The finest silica sands in America are mined in the Ottawa-Wedron region of Illinois where all of WEDRON'S sands are produced.

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pass of operations, nevertheless.

Today's practice is based upon the thinking of yesterday, and in reading over the old articles you may be surprised to learn just how good much of that thinking proved to be. Many of the early theories have been proved erroneous, of course, but in the process of establishing this proof, tremendous knowledge was gained, much of which was seemingly accidental. By this I mean that in attempting to establish one conclusion, our foundrymen often arrived at another of even greater importance.

For the faithful compilation and preservation of these reports for many years, the foundry industry owes a tremendous debt of gratitude to Robert E. Kennedy.

Study Shows Why Apprentices Quit and Where They Went

Almost half of the apprentices who fail to complete their training quit for higher-paying jobs, according to a U. S. Department of Labor booklet entitled "Follow-Up Study of Former Apprentices." Others left because they could not master the required skills or classroom instruction, and some considered apprenticeship a stepping-stone to a professional career.

Many who left for higher wages would have been better off financially if they had completed their training, the study shows. About 900 former apprentices were covered in the analysis. The survey emphasizes the importance of sticking to the training. It shows that 16 per cent of those who left in the first year, 27 per cent of those who left in the second year and 51 per cent of those who left in the third or fourth years were employed in the trades in which they had been apprenticed. Management positions increased with years of apprenticeship completed.

Color Film Covers Fans

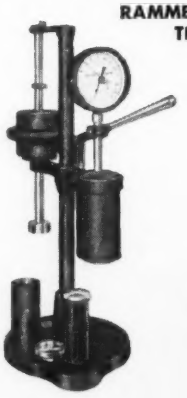
Aerovent Fan Co., 741 Ash St., Piqua, O., has prepared a 16-mm sound film in color called "Industrial Axial Flow Fans." It is available for showing to interested groups. The movie was filmed and produced in Aerovent's engineering department and describes the three basic types of axial flow fans. It also discusses static pressure limitations of propeller fans, common misconception regarding noise levels of these units and extensive information on the method of determining reliable fan performance and rating data.

THE **Short Cut** *TO LOW* **Scrap Losses**

When consideration is given to the number of casting defects directly traceable to faulty sand practice, it becomes apparent that proper sand control is the short cut to low scrap losses.

The Gordon-Campbell sand testing units offer the latest improvements for checking these critical properties of sand mixtures: clay content, permeability, bond strength, moisture, core hardness, and core strength. The tests are quick, and no calculations are required. They offer the simplest approach to sand control.

Write for full particulars on Gordon-Campbell sand control units. Savings in scrap losses will pay for the program.



RAMMER-COMPRESSION TESTER—This simple unit combines ramming of specimens for permeability tests and making bond strength tests. Strength values are read on large dial.

PERMTESTER Permeability values for molding and core sand mixtures are shown on dial in a few minutes.

All Gordon-Campbell sand testing units are designed to conform with the recommendations of the Committee on Foundry Sand Research of the American Foundrymen's Society.

FREE TO ANY FOUNDRY MAN

Write for this booklet. It explains foundry sand control and how to reduce scrap losses.

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Use of Proper Lighting Can Reduce Accidents

Install Correct Equipment And Maintain It Well

By Ernest W. Fair

DEFECTIVE ILLUMINATION is a common and expensive cause of defective eyesight and accidents despite the fact that the major lighting defects may easily be recognized and in most cases eradicated," declared Dr. Le Grand H. Hardy, director of eye service, Fifth Avenue Hospital, New York, before a safety conference in that city. "The best available statistics indicate that about 40 per cent of our industrial workers have defective vision due to ocular defects and this number is probably being increased by unhygenic lighting conditions and poor illumination."

Good lighting in the foundry is a maintenance as well as a design function. Lighting equipment not only should receive maintenance attention, but the plant superintendent anxious to keep accident costs down in his plant should see that such attention is applied on a day-to-day basis.

Good illumination practice in even the smallest foundry begins with assurance on the part of management that the proper amount of light is made available to workers, not only to assure high production standards but also to reduce accidents. The Illuminating Engineering Society of America, after many checks of actual foundries, studies of lighting conditions and accidents caused by improper lighting, has recommended that a standard of 5 foot-candles be maintained on the charging floor and in tumbling, cleaning, pouring and shakeout operations; a standard of 10 foot-candles in rough molding and coremaking operations; and 20 foot-candles in fine molding and coremaking. The first check should be made at these points.

Usually the engineering department of the local public service company office will make such a survey without charge. Attention should be given to the possible need of greater lighting around hazardous equipment or in areas where natural illumination is scant.

The next step is to make certain that lighting equipment is properly installed and in proper condition. An unshaded light source, particularly around foundry equipment that has a high reflective value, can create glare; and glare in turn can cause a bad accident around that particular piece of equipment.

Check List—Here is a regular maintenance check list to make sure each source of illumination in the foundry is doing its job:

Discard flickering tubes, which create great strain on any employee's eyes. Usually they are caused by defective conditions or by a tube which has reached its life limit.

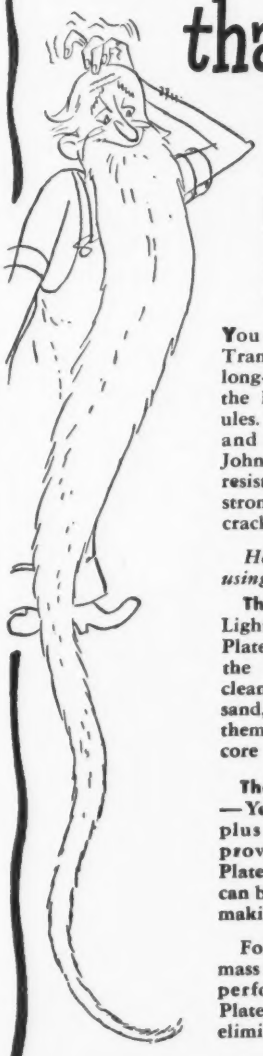
Badly adjusted reflectors are the cause of glare and have been the source of many accidents. Inspection to eliminate them should be on the check list of every foundry.

Improper installations have caused many accidents, particularly those within the line of vision of workers.

Dirt and dust on globes and tubes greatly reduce their normal output of light. A foundry with a satisfactory foot-candle rating, for example, can be losing as much as half of it through inattention to regular cleaning of globes, fixtures and reflecting surfaces.

Lack of uniformity often is listed as a cause of poor lighting. Wide variations in the intensity of light in adjacent areas is high on the list of causes of foundry accidents, particularly where workers must move from one light source to another quickly.

Looking for core plates that LAST LONGER?



. . . then use TRANSITE CORE PLATES that stay on the job year in, year out

You can rely on durable Transite* Core Plates to give long-term service, even under the heaviest foundry schedules. Made of fibrous asbestos and cement, by a special Johns-Manville process, they resist shock and corrosion, are strong and durable, will not crack or break easily.

Here are more reasons for using Transite Core Plates:

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They maintain accuracy—Years of foundry service, plus exhaustive tests, have proven that Transite Core Plates do not warp readily . . . can be used for precision core making indefinitely.

For core plates of large mass and small surface area, perforated Transite Core Plates are also available to eliminate green cores and reduce baking time. For full details, write Johns-Manville, Box 60, New York 16, N.Y.

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NOMAD CONVEYOR SYSTEMS
"You can take it EASY..."
The flexibility built into Nomad Conveyor Systems is simplicity itself. Just add the auxiliary equipment you need and you will be amazed how smoothly and quickly the molds move down the line. Use transfer cars, curves and switches, or a turntable in close quarters. You'll find your foundry layout can be space-saving and compact—that there are no aching backs to hinder high efficiency and profit-making production.
Write for more information on how to "cut corners" in your foundry.
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Spotty illumination can provide neither good production nor safety. This point is a matter of relative brightness, surface reflection and the lack of ability of the ordinary person's eyes to adjust immediately themselves to wide changes in the amount of illumination.

Low-level lighting may be very artistic in photography, but it is an accident cause in any foundry because of resulting eye strain and fatigue.

Color Contrast—Another factor of importance insofar as illumination and safety are concerned is the use of color contrast. A great deal of research work has been done on this topic recently, and paint colors now are being used to aid illumination and accident prevention.

The Pittsburgh Plate Glass Co., for example, has released a suggested color contrast schedule of painting for plants. It is designed to provide high illumination value and effective color contrast to reduce accidents caused by improper illumination. Among its recommendations are the following: *Focal white* for machine beds, frames and working points; *focal ivory* for working points on machines; *focal buff* for working points on machines or areas immediately adjacent; *focal green* for horizons or walls forming a background behind equipment; *focal light gray* for aisle floors; and *focal blue* for ceilings.

Among other recommendations are *focal red* on switch boxes, start and stop button-panels, fire-fighting equipment, exits and other safety devices; *focal orange* on working platforms, ladders, etc.; *focal dark gray* on floors where high reflection is not needed; and a series of standard identification colors on controls, valves, etc.

Use of fluorescent lighting also can reduce accidents. This type of lighting is recommended because it has a higher over-all efficiency, provides an improved quality of light closely approaching daylight, has less sensitivity to voltage fluctuations which cause eye strain and operates at lower temperatures which permit a greater degree of comfort where employees must work close to the light source itself. This type of light almost eliminates refractive errors, which are potentially dangerous around many different types of equipment, by reducing fatigue.

Precaution and attention to equipment can be wasted, however, through lack of good housekeeping on artificial lighting in the foundry. Here are five suggestions on proper maintenance from a number of experts:

1. Clean lamps and reflectors regularly. In a single month, dust collection in even the cleanest foundry can

result in as high as an 18 per cent decrease in lighting efficiency without regular wiping and washing.

2. Pay strict attention to the conditions of walls and ceilings if they are important as reflecting surfaces in the foundry.

3. Replace burned out lamps immediately. Usually it is best to replace every lamp before it burns out or as soon as deposits are noted on the inner surface of the glass.

4. Check voltage regularly. Undervoltage can cause drops in illumination standards. A 10 per cent drop in voltage will cause even a fluorescent lamp to flicker.

5. Check frequently to be sure the proper combination of lamp and luminaire is being used. Using just any globe replacement handy often has been the cause of an accident. It's a good idea to paste a small sticker on each luminaire showing the proper lamp to be used.

Study Radioactive Tracers For Use in Metallurgy

A research program to investigate the application of radioactive tracers to the study of metallurgical problems is described in a report made available to industry by the Office of Technical Services, U. S. Department of Commerce. The research was conducted for Army Ordnance by the Engineering Research Institute, University of Michigan, Ann Arbor, Mich.

Problems studied using autoradiography were diffusion of nickel into iron, distribution of sulfides in iron, distribution of bismuth in copper, diffusion of liquid bismuth into copper, diffusion of nickel into copper, distribution of hydrogen in copper-tin alloys and distribution of sulphur in nodular iron. Order PB 111558 from OTS, U. S. Department of Commerce, Washington 25, for $2.25.

AMA Releases Booklet on Personnel Management

Latest addition to the American Management Association's Personnel Series is booklet 161, "What's New On the Labor-Management Front?" The booklet reviews the latest developments in labor-management relations and sets forth the implications of these changes for all personnel executives. Specific problems and practical solutions, without neglecting long-range considerations, are discussed in four articles.

Prof. Carroll B. Daugherty, Northwestern University, surveys "Some Labor-Management Trends and Their

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Implications." Raymond E. Smethurst, attorney, writes definitely to indicate that "Taft-Hartley is Not Static." Mathew M. Gouger, vice president, General Aniline & Film Corp., draws on his experience in industrial relations to write on "Negotiating a Competitive Company-Union Contract." "The Pivotal Issue: The Guaranteed Annual Wage" is reviewed by Prof. William L. Dennis, New York University Law School.

Copies are available from the association, 330 West 42nd St., New York 36. Price is $1 to members $1.75 to nonmembers.

ASTM Announces Nominations Of Officers, Directors

Nominations for new officers for the coming year have been announced by American Society for Testing Materials. Official notice of their election will be made at the society's 58th annual meeting, Atlantic City, N. J., June 26-July 1.

Claire H. Fellows, Detroit Edison Co., Detroit, was nominated for president, and Richard T. Kropf, Belding Heminway Co., New York, vice president. Nominees for directors for three-year terms include: F. L. LaQue, International Nickel Co., New York; A. Allan Bates, Portland Cement Association, Chicago; Richard C. Alden, Phillips Petroleum Co., Bartlesville, Okla.; John C. Moore, National Paint, Varnish and Lacquer Association, Washington; and E. F. Lundeen, Inland Steel Co., Chicago.

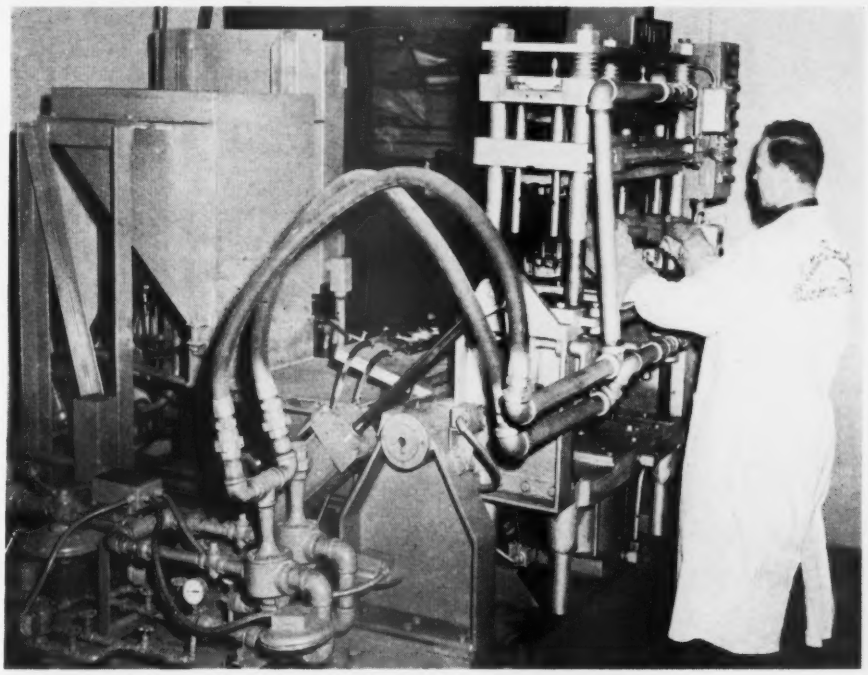
Book Review

Turboblowers, by A. J. Stepanoff, cloth, 377 pages, 6 x 9 in., published by John Wiley & Sons Inc., 440 Fourth Ave., New York 16. Price $8.

This book deals with the hydrodynamic and thermodynamic aspects of the turboblower design. It discusses the art of building turbocompressors and outlines new methods of attack on turbomachine problems. Author presents a theoretical treatment of the compressor impeller based on a single pattern of flow, and extends this treatment to similar design procedure for centrifugal and axial flow impellers.

Author's axial flow compressor design method is based on actual fluid deflection and observed pressure and capacity coefficients, rather than lift and drag coefficients, which are a part of air foil theory. The latter is discussed so as to demonstrate its weaknesses and limitations. Also shown are ways by which fan performance may be improved with little or no increase in costs.

Machine Blows and Cures Shell Cores and Molds



AUTOMATIC machine blows hollow and solid resin-bonded cores or shell molds and fully cures them at the rate of 50 to 90 cycles per hour. Cores or molds are ready for immediate use or may be stored indefinitely without deterioration. The molds are produced with accurate inside and outside dimensions, permitting their use in stack molding. Current model of the machine takes a corebox 14 x 24 x 7 in. deep. Plans are to offer the machine in a larger size, possibly to handle a 20 x 60 in. box.

The machine uses precoated sand, and sand consumption for hollow cores is about half that of identical solid cores. Solid cores or molds weighing up to 20 lb may be produced. Electrical switches, timers and solenoid valves control air cylinders, which move the machine components.

Split core or mold boxes heated by individually controlled gas burners are used. Separate banks of burners heat top and bottom halves of box. Thermocouples in each half box hold box at a predetermined temperature —usually 450-500°F. Machine blowplate is water-cooled to prevent sand buildup around the blow holes.

As the starting button is pushed, the machine closes the corebox in a vertical plane. Box is mounted in the machine so that the blow opening is in the back. The closing device rocks back to engage the blowhole in the box with the blowplate at 75 degrees of travel. The blowplate is mounted on arms pivoted at the same point as the closing device. Box and blowplate move together to a horizontal position where they are held by air cylinders against a pressure chamber containing the sand-resin mix.

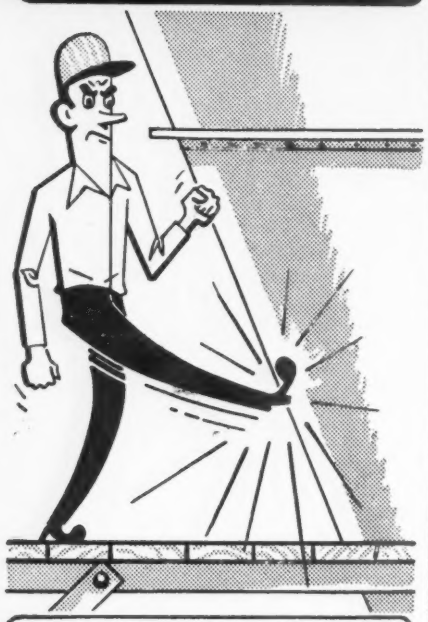
Sand mix is blown up into the box. When the blow valves are closed, pressure in the pressure box is allowed to diminish through leakage (4 to 5 seconds) until it reaches 5 to 10 lb and then is exhausted. The delay permits sand to build up on the heated corebox. As the air is exhausted, the corebox is vibrated to remove uncured sand for a hollow core. No vibration is needed for solid cores or molds.

Shell is cured as corebox is rocked up to vertical. The blowplate goes up with it for the first 15 degrees from horizontal position, thus permitting the pressure chamber to roll back under a sand hopper for recharging. When the corebox reaches vertical, the top half is raised ¼-in., but top and bottom pins, which rest against the core, remain stationary. This permits a clean draw. At ¼-in., the top pins start to raise with top half of the box for an additional 3½ in. Then the bottom pins raise the core 3½ in. out of the bottom half of the box. Total opening between open faces is 7¼ in.

At this point the finished core or mold may be removed from the pins. Pushing the starting button repeats the production cycle. Separate pushbuttons also permit control of individual machine operations.

The machine is made by Sutter Products Co., 2005 Westwood Ave., Dearborn, Mich.

BIN STUCK LATELY?



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For More Details Use Reply Card—Page 251

SAND PROPORTIONING: Richardson Scale Co., Van Houten Ave., Clifton, N. J.—Technical reference 55A describes automatic proportioning of foundry sand and core binders, outlines various requirements of a typical proportioning operation and suggests two methods to meet these requirements.
For More Details Circle No. 141—Page 251

ALUMINUM FINISH: Monarch Aluminum Mfg. Co., 9210 Detroit Ave., Cleveland 2, O.—Brochure details results of successful tests on applying vitreous enamel on aluminum castings. Advantages of vitreous enamel as both a colorful finish and abrasion-resistant protective coating are outlined.
For More Details Circle No. 142—Page 251

COMPRESSORS: Cooper-Bessemer Corp., Mount Vernon, O.—Bulletin 76 describes a V-angle engine-driven compressor available in 4-10 cylinders of 9¾-in. bore and 10½-in. stroke. Engine develops 265-660 hp at 450 rpm. Data on latest developments in compressor design are provided.
For More Details Circle No. 143—Page 251

LAYOUT TAPE: Labelon Tape Co., 450 Atlantic Ave., Rochester 9, N. Y.—Illustrated booklet discusses advantages of using layout tape in making up transparent and opaque plant layouts. Available types are illustrated, including those showing lines, arrows, numbers, letters, and structural and material conveyor symbols.
For More Details Circle No. 144—Page 251

CHAIN HOIST: Chisholm-Moore Hoist Division, Columbus McKinnon Chain Corp., Fremont Ave., Tonawanda, N. Y.—Heavy duty version of small electric hoist, in capacities from ⅛ to 1 ton, for operation on 115-v and 208-220/440-v power, is described in Bulletin 158.
For More Details Circle No. 145—Page 251

NODULAR IRON: Aetna-Standard Engineering Co., Frick Bldg., Pittsburgh 30, Pa.—"Nodular Iron for Rolls and Castings," an 8-page bulletin, includes description of nodular iron, qualities, physicals, specifications, roll and casting applications.
For More Details Circle No. 146—Page 251

GRATING AND TREADS: Blaw-Knox Co., Equipment Division, Grating Dept., Pittsburgh 38, Pa.—Bulletin 2486 describes types, sizes and load characteristics of line of electroforged steel and interlocked aluminum grating and treads.
For More Details Circle No. 147—Page 251

OVERHEAD CRANES: Chicago Tramrail Corp., 1330 South Kostner Ave., Chicago 23, Ill.—Bulletin T202

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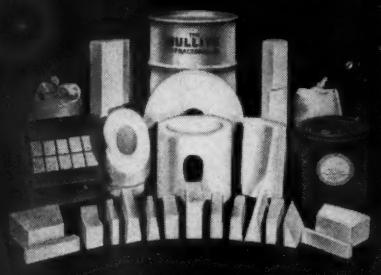

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For More Details Circle No. 148—Page 251

DIE CASTING MACHINE: American Die Casting Machinery Co., 1516 West Thomas St., Chicago 22, Ill.—Illustrated folder contains engineering data on die casting machine that will handle shot capacities up to 2½ lb. Air or hydraulically operated plunger gooseneck or cold chamber types can be supplied. Either standard or fire-resistant fluids may be used in hydraulic unit.
For More Details Circle No. 149—Page 251

TANKS: Denver Equipment Co., P. O. Box 5268, Denver 17, Colo.—Bulletin T2-B5 contains illustrations and facts about company's wood, steel and rubber covered tanks for industrial applications. Construction, dimensions, specifications and prices are given for bolted steel tanks, bolted steel thickener tanks, bolted steel tray tanks, welded steel tanks and wood tanks as well as a complete description of overflow launders available for every purpose.

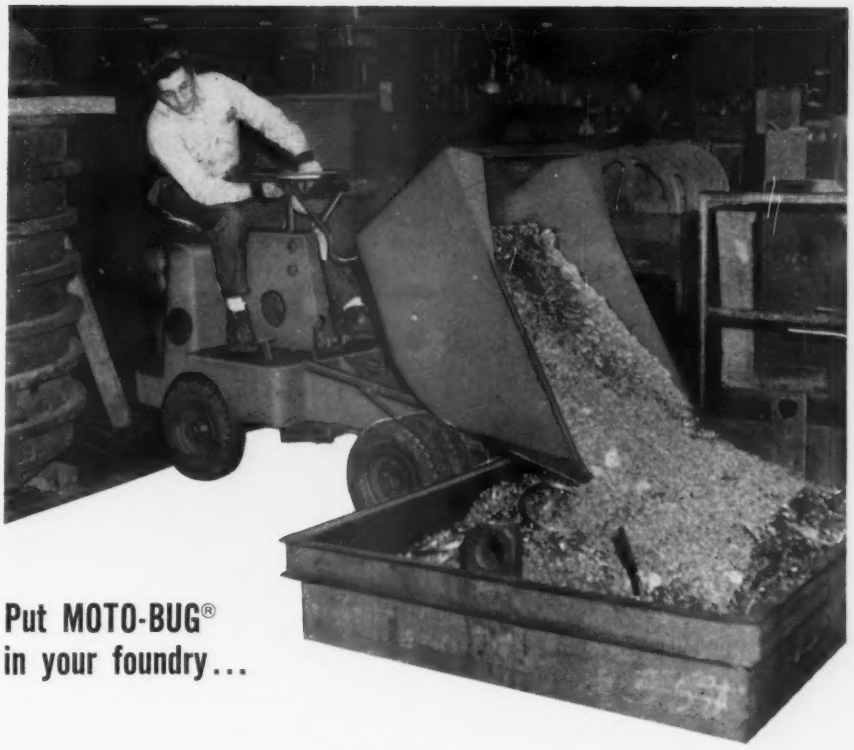
For More Details Circle No. 150—Page 251

ATMOSPHERE CONTROL: Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44, Pa.—Catalog TD4-620 (1), "The Homocarb Method with Microcarb Atmosphere Control for Heat Treatment of Steel," relates how company's furnaces are being used for case carburizing, carbon restoration, homogeneous carburizing and hardening of steel products on a reproducible, mass production basis.
For More Details Circle No. 151—Page 251

MOTOR PUMPS: Ingersoll-Rand, Cameron Pump Division, 11 Broadway, New York 4, N. Y.— Form 7093-E covers line of close-coupled motor pumps from ¼ to 74 hp sizes for delivery of 5 to 2800 gpm. Tables of dimensions, weights, performances and mountings and pipe friction tables are included.
For More Details Circle No. 152—Page 251

MATERIALS HANDLING: Market Forge Co., Materials Handling Division, 35 Garvey St., Everett 49, Mass.—Bulletin 1206 MH is a list of company's materials handling products printed as a letter-size file folder for easy reference.
For More Details Circle No. 153—Page 251

MEMBRANE FILTER: Millipore Filter Corp., 36 Pleasant St., Watertown 72, Mass.—Brochure gives de-



Put MOTO-BUG® in your foundry...

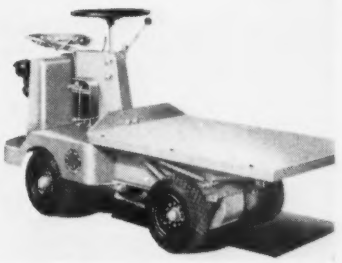
haul 1-TON loads with 1-man economy

You can earn substantial savings in time and labor with one of these Kwik-Mix Moto-Bugs in your foundry. Big 4-wheel model shown above carries up to 2000 pounds, or 15 cu. ft.* of bulk materials each load . . . hauls sand, scrap, slag, coke, small castings or any other materials you shovel, stack or load in the gravity-dump hopper.

85% of loaded weight on front drive wheels, and 8.3 h.p. gas engine, provide plenty of tractive power to climb 16% grades, carrying maximum 1-ton load. Moto-Bug also can be used as a small tractor. Fully loaded, it gives you 550-lbs. drawbar pull for towing wagons or carts.

Moto-Bug travels 6 m.p.h. forward or reverse, has automatic brakes. Clutch lever and brake pedal are within easy reach of seated operator. There's 24-to-1 gear reduction ratio on steering wheel. Turning radius is only 73 inches . . . overall width, 35 inches. Get complete details on this latest model Moto-Bug from your Kwik-Mix distributor . . . or write to us.

*18 cu. ft. hopper optional



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Also check smaller, 6 h.p. Moto-Bug, 3-wheel type. Has 10 cu. ft. hopper . . . interchangeable ¾-ton platform, and the ½-ton capacity fork lift attachment.

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tailed information on use of membrane filter in research, production and quality control applications. Filter is made in sheets of cellulose esters about 0.005 in. thick, containing 50 million pores per square centimeter for effective screening of submicron particles.

For More Details Circle No. 154—Page 251

STAIR CART: Valley Craft Products Inc., Division of O'Neil-Irwin Mfg. Co., 760 Jefferson, Lake City, Minn.—Form KEV illustrates working mechanisms of a stair cart equipped with power drive that rolls it step by step as operator pulls drive cable. A variety of models can be supplied to handle sacks, boxes, barrels, drums, welding tanks or other bulky items.

For More Details Circle No. 155—Page 251

BLAST CLEANING ROOMS: Parsons Engineering Corp., 4590 Beidler Rd., Willoughby, O.—Bulletin R-41 provides information on general specifications and dimensions of company's turntable, monorail or car type blast cleaning rooms equipped with overhead dust arresting systems.

For More Details Circle No. 156—Page 251

PREVENTIVE MAINTENANCE: Multi-Amp Corp., 10 Third St., Newark 7, N. J.—Reprint article discusses testing of current-actuated protective devices as an aspect of the preventive maintenance program. Article describes a modern technique for running performance checks on motor starter overload relays to determine trip times.

For More Details Circle No. 157—Page 251

CORE BINDER: Reichold Chemicals Inc., 525 North Broadway, White Plains, N. Y.—Technical Bulletin F-7 details characteristics, specifications, advantages and methods of use of a resin sand core binder that is said to unite the green working properties of conventional core oils with the casting properties of water soluble phenolic resins.

For More Details Circle No. 158—Page 251

PROCESS CONTROL: Barber-Colman Co., Wheelco Instruments Division, Rockford, Ill.—Bulletin 9 presents technical data, operational diagrams, schematic drawings and general information in the application of automatic control equipment to the solution of industrial process control problems.

For More Details Circle No. 159—Page 251

PIPE LINE FILTERS: Air-Maze Corp., 25000 Miles Rd., Cleveland 28, O.—Brochure covers line of pipe line filters designed for removal of water, oil, dirt and pipe scale from compressed air or gas lines. Filters have been engineered for pressures up to 150 psig.

For More Details Circle No. 160—Page 251

ALUMINUM FLUXES: Apex Smelting Co., 2537 West Taylor St., Chicago 12, Ill.—File-sized booklet

BIG SAVINGS IN PATTERN SHOP TIME AND LABOR

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SCIENTIFIC Pressure Cast MATCH PLATES

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WRITE FOR BULLETIN NO. 52

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contains information on aluminum fluxes and how they contribute to the economical production of aluminum castings. Sources of contaminants, a description of aluminum alloys and a factual comparison of mechanical properties of fluxed and unfluxed aluminum alloys also is given.
For More Details Circle No. 161—Page 251

SAND DISTRIBUTION: Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4, Mich.—Illustrated folder describes control equipment and accessories used in automatic sand distribution system. A sand monitor co-ordinates mulling and distribution while one of two controls (for tempered or dry sand) indicates sand level in molders' hoppers, storage bins, slinger hoppers or other holding units.
For More Details Circle No. 162—Page 251

EPOXY RESIN MIXTURE: Metals Disintegrating Co. Inc., Elizabeth B., N. J.—Technical bulletin 205 describes an aluminum-powder-reinforced epoxy resin casting compound for use in making sheet metal forming dies, holding and positioning jigs and fixtures and similar tools for metal-working and plastics molding. A bibliography of articles on epoxy resins also is included.
For More Details Circle No. 163—Page 251

WELDING ROD GUIDE: Eutectic Welding Alloys Corp., 40-40 172nd St., Flushing 58, N. Y. — "Rod Finder Guide" (TIS 1126) gives welding and plant foremen who plan and lay out work a source of the "right rod for the right job." Booklet covers flux and rod as well as electrode recommendations for torch and metal arc joining and overlaying of all base metals.
For More Details Circle No. 164—Page 251

MULTI-POINT PYROMETER: West Instrument Corp., 525 North Noble St., Chicago 22, Ill.—Bulletin IN-1 describes multi-point system to permit taking nearly simultaneous readings at several points on a single, centrally located pyrometer.
For More Details Circle No. 165—Page 251

WIRE THREAD INSERTS: Heli-Coil Corp., Danbury, Conn.—Bulletin 724 illustrates method of making permanent thread repairs in steel, cast iron, aluminum, magnesium, copper, plastics or wood with inserts supplied from company's repair kit.
For More Details Circle No. 166—Page 251

MEEHANITE CASTINGS: Meehanite Metal Corp., 714 North Ave., New Rochelle, N. Y.—Wall chart contains complete design and engineering properties of various types of Meehanite castings available to industry.
For More Details Circle No. 167—Page 251

BULK CONVEYORS: Jervis B. Webb Co., 8951 Alpine Ave., Detroit 4, Mich.—Illustrated catalog covers line of bulk conveyors for handling coal, ashes, sand, gravel, aggregate,

TRUCKS for Foundries!

Sterling Heavy Duty Trucks are tailor-made for transporting castings, cores and heavy foundry equipment. Ruggedly constructed for heavy duty service and thoroughly job-tested under actual foundry conditions, Sterling Trucks have proven their ability to handle loads as heavy as 3 tons. Both wheels and casters are equipped with anti-friction bearings. Short turning radius. Easy maneuverability. Write for bulletins.

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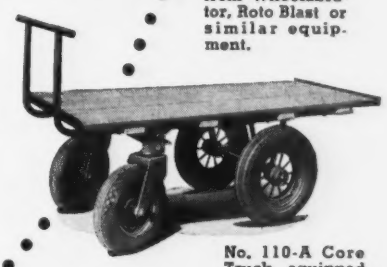
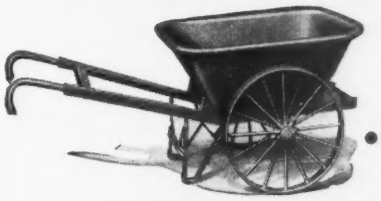
No. 160 Truck to receive castings from Wheelabrator, Roto Blast or similar equipment.



No. 110-A Core Truck equipped with pneumatic-tired wheels and ball bearing swivel casters.



No. 50 Slag Buggy especially designed for conveying slag. Heavy duty, reversible tray. Loose plate for discharge.

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FOUNDRY EQUIPMENT

A 5633-½R

OVENS FOR THE FOUNDRY by DRY-SYS

• SMALL or LARGE—any size—for any specific application. Dry-Sys Ovens are designed to your individual problems with an *extra* margin of capacity operating at top efficiency—sturdily constructed to render years of service under steady, full-schedule use.

OVENS for
CORES • MOLDS • LADLES • TEMPERING
ANNEALING • PAINTING

External Air Heating Units supply full air circulation.

Adequate Ventilation expels fumes and maintains safe operating condition.

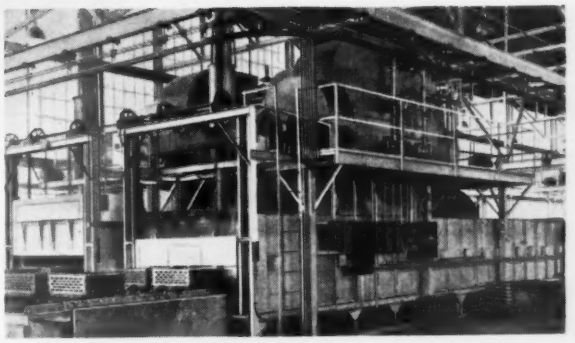
Complete Insulation -Sturdy Construction for economy and added years of service.

Automatic Temperature Control

-Latest Safety Devices

EACH DRY-SYS OVEN IS DESIGNED TO INDIVIDUAL REQUIREMENTS

MANUFACTURED IN OUR OWN FACTORY AND ERECTED COMPLETE IN YOUR PLANT



• A battery of gas-fired Dry-Sys Ovens with heating equipment overhead and power-operated lift doors. Suitable for handling cores, molds, annealing, and stress relieving.

We will gladly make design recommendations and submit quotations—No obligation.

DRYING SYSTEMS, INC.
1814 Foster Ave. CHICAGO 40, Ill.
ENGINEERS • CONTRACTORS • MANUFACTURERS
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A SILICON CARBIDE SLAG HOLE BLOCK COSTS AS LITTLE AS

CARBOFRAX® silicon carbide slag hole blocks last *twenty or more hours* in continuous pour cupolas . . . a full day's run and then some! And they provide this kind of service with *little or no change in hole size.* . . . Can you say the same of your present slag hole blocks? If not, better order a CARBOFRAX block from us right now and see for yourself how much better it is. Single standard size block costs $4.70. Other sizes available from stock molds. Address Dept. AA75, Refractories Division, The Carborundum Company, Perth Amboy, N. J.

CARBORUNDUM Registered Trade Mark

RENT OR BUY
SILENT HOIST
LIFTRUK
on the
"DAY-BY-DAY EARN-ITS-WAY PLAN"

3-5-7½-10-15 ton CAPACITIES

***Exclusive-* FLUID DRIVE**

If you can reasonably use a Heavy Duty LIFTRUK for at least two hours a day average, to improve the movement of goods in process or reduce materials handling operations, then you should be interested in this unusual "rent-or-pay-as-you-use" plan. Proper cost accounting methods often show that man-hours saved, storage space gained, or time in transit reduced, add up to a profit well above the payments required for LIFTRUK for purchase or rental charges.

Write for "Earn-Its-Way" Plan to

SILENT HOIST & CRANE CO.
Pioneer Mfrs. of Heavy Duty Materials-Handling Equipment
885 63rd Street, Brooklyn 20, N. Y.

chips or other material. Illustrations show a wide range of installations in a variety of applications. Drawings of head and tail ends, cross sections, drive and takeup units also are shown.

For More Details Circle No. 168—Page 251

ROOF COATING: Monroe Co. Inc., 10703 Quebec Ave., Cleveland 6, O.—Sketches and action photos in bulletin LL-219 illustrate application methods of an aluminum coating for roofs that is said to repel about 70 per cent of the sun's heat and substantially lower internal building temperatures.

For More Details Circle No. 169—Page 251

BAR CONDUCTORS: Insul-8-Corp., 1285 Rollins Rd., Burlingame, Calif.—Bare bar conductors for supplying electric power to cranes and monorails are described in catalog B8-55. Capacities from 100 to 350 amperes are available.

For More Details Circle No. 170—Page 251

FIRE HOOD: Mine Safety Appliances Co., 201 North Braddock Ave., Pittsburgh 8, Pa.—Bulletin describes fire hood which protects head, face, neck and shoulders against extreme heat.

For More Details Circle No. 171—Page 251

HEAVY-DUTY CONTACTORS: Allis-Chalmers Mfg. Co., 1032 South 70th St., Milwaukee 1, Wis.—Heavy-duty direct current contactors and control relays for heavy industry applications are described in Bulletin 14B8171A.

For More Details Circle No. 172—Page 251

FOUNDRY reprints

Shell Mold Line Expands Malleable Castings Output by Robert H. Herrmann describes the integrated shell molding system at Link-Belt Co.'s malleable iron foundry in Indianapolis. Eight men operate the system and produce 180 molds an hour. Four-station rotary machine has a designed capacity of 240 molds per hour.

For a Copy Circle No. 173—Page 251

Grain Refinement of Magnesium Castings by Robert T. Wood outlines the procedures used in a series of experiments showing that hexachlorobenzene gives improved metal properties and lower operating costs when used as a grain refining agent for magnesium.

For a Copy Circle No. 174—Page 251

Closed-Top Cupolas End Air Contamination by Robert H. Herrmann details an installation of four hot-blast, sealed cupolas with wet impingement-type collectors that almost completely eliminates atmospheric contamination due to stack discharge. The system is at the Ford Motor Co. Dearborn Iron Foundry, Dearborn, Mich.

For a Copy Circle No. 175—Page 251

Step ahead in this five billion dollar market with

Foundry's PLUS 5 SERVICE

What is PLUS 5? It's your key to more business from foundries. It gives every FOUNDRY advertiser a bonus he can get from no other source. Here is help in analyzing this market—studying sales territories and potentials—planning the sales effort—and creating a constructive promotion program to the 5 billion dollar foundry market. It's time to take a new look at this market—and at the unusual selling aids we have for you. Say PLUS 5 to your FOUNDRY representative and he'll show you this 5-step program designed to move more of your products into foundries.

A Penton Publication

FOUNDRY

more than a magazine . . . a complete sales development service

Penton Building, Cleveland 13, Ohio

Core or Molding Sand . . .

SIFT
MIX
AERATE

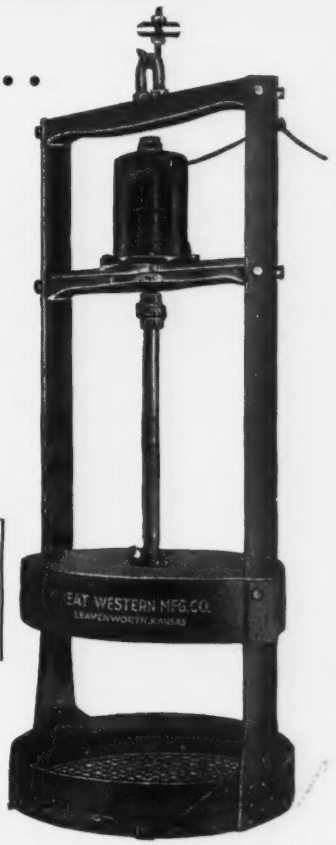
FINE
MEDIUM
COARSE

COMBS

FOUNDRY

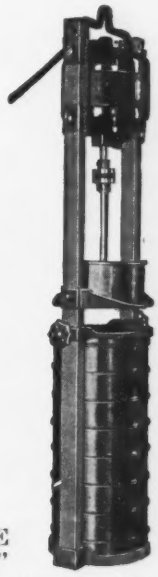
RIDDLES

WORLD FAMOUS!



TYPE "CR"
24″ dia. round sieve. Thoroughly sifts, mixes, fluffs, aerates the sand. ⅓ H.P. enclosed motor. Height 4′6″, weight 250 lbs. Complete: $310.00.

TYPE "V"
Screens sand Fine, Coarse, Medium. 20″ dia. sieve with special clamp for 5-second changes. Does work of 10 men. Fully-enclosed 1/6 h.p. motor. 4′6″ high, weight 100 lbs. 20″ Sieve: $250.00. Giant V-5, 36″ Sieve: $450.00.



PROMPT DELIVERY FROM YOUR FOUNDRY SUPPLY HOUSE

TYPE "CS"
24″ square sieve. Continuous operation, no dumping. Refuse tails off to one side. Height 4′ 10″, weight 295 lbs. With ⅓ h.p. enclosed motor. Complete: $320.00.

TYPE "HL"
Laboratory model . . specially designed for sand control. Fitted with 1/6 H.P. motor. Price, complete less sieves: $225 00.

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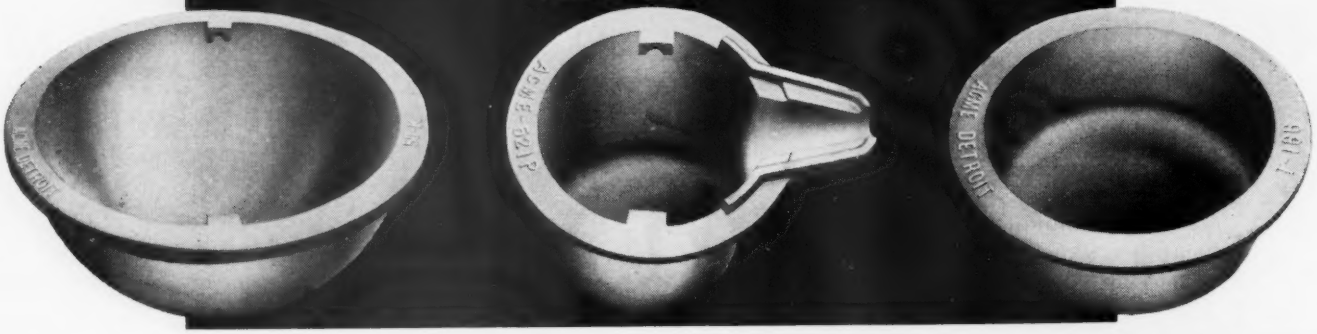

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AUTOMOBILE CYLINDER LINERS

DIESEL ENGINE LINERS

BRONZE BUSHINGS

on the new WATER-COOLED Model M-WC (Illustrated)

Utilizes low cost permanent molds of available steel tubing to produce gray machinable cast iron or bronze bushings. Water cooled molds can be maintained at either high or low temperature easily. High or limited production in very small space with unskilled labor. Completely safe for workmen. Simple, sturdy equipment. Quick changeover from one mold to another. Practically 100% metal yield of high quality, denser castings. Metal porosity eliminated.

Write for new Bulletin # 153 Illustrating Model M-WC

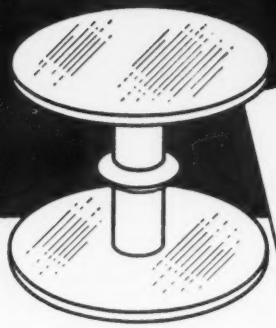
RESEARCH FACILITIES

We have available an Experimental Foundry equipped for ferrous and non-ferrous melting for both vertical and horizontal centrifugal casting production. Our facilities are available to foundries for research or trial centrifugal castings at low cost.

Centrifugal Casting Machine Co.

P. O. Box 947 Tulsa 1, Okla.

no chance for leakage here



Buffalo CHAPLETS

Exclusive fin design of both Double and Single Head types assures positive fusion with molten metal. No recess in stem to weaken structure. Leakage problem is ruled out. Burns in more easily. Does not chill molten metal.

In addition, extensive variety of other types to meet your needs exactly. Since 1912, serving the nation's leading foundries. Trial samples without charge.

Complete information in Catalog No. 16

Manufactured by
Combined SUPPLY & EQUIPMENT CO., INC.
211 CHANDLER ST., BUFFALO 7, N. Y.

No. 4 DAYTON RING VALVE BENCH RAMMER

MORE POWER—MORE SPEED

You'll get more production with these faster, more powerful rammers and at the same time substantially reduce maintenance costs.

The Valve Units will last for years. The Cylinder Bores and Piston Rods are HARD CHROME PLATED which doubles the life of the Rammer. Many of the largest foundries in the country have already adopted them as standard. Made in six sizes to meet every requirement.

Send for Bulletin 300

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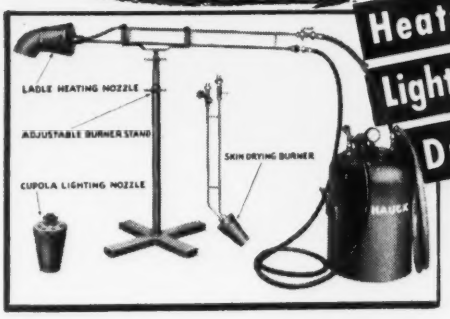
Manufacturers of Pneumatic Tools Since 1903

DAYTON, OHIO

1 OUTFIT DOES ALL 3

Heats Ladles
Lights Cupolas
Dries Molds



Simple • Speedy • Economical

HAUCK
All-Purpose
BURNER EQUIPMENT

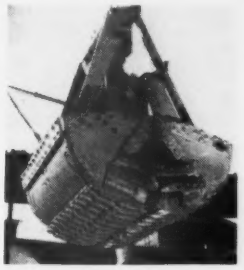
The many heating jobs this Hauck Foundry Outfit performs is positively amazing! Interchangeable nozzles make the equipment equal to 3 separate burners. Burns fuel oil, kerosene or any fuel gas, with compressed air. No preheating; no carbon. Flame size instantly adjustable. Eliminates smoke, noxious gases, ashes.

Write for Catalog 1043C

HAUCK MANUFACTURING CO.
Oil and Gas Burners for Core Ovens, Annealing Furnaces, Heating and Drying
106 TENTH STREET • BROOKLYN 15, N. Y.

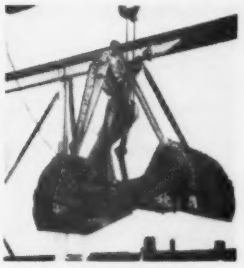
HOW TO MEET FOUR COMMON FOUNDRY BUCKET REQUIREMENTS

BLAW-KNOX "SHARK TOOTH" BUCKETS HANDLE COKE WITH MINIMUM DEGRADATION



Use this versatile *dual-purpose* bucket for efficient coke handling. Without the liner plates, the shark teeth literally finger their way through the coke so it can be handled with minimum degradation. Hook-on feature permits quick change for other foundry service requirements.

BLAW-KNOX "SHARK TOOTH" BUCKETS *with liner plates* HANDLE SAND WITH MINIMUM LEAKAGE



This open head type Single-Line Hook-On Bucket *with liner plates attached* inside of the shark teeth, economically handles sand, coal, small limestone and granular fines with minimum leakage!

BLAW-KNOX SINGLE-LINE HOOK-ON TYPE BUCKETS FOR EXTREMELY LOW HEADROOM

This Single-Line Hook-On Bucket solves rehandling problems when headroom is extremely limited. The ¾ yd. capacity bucket requires only 6'7" operating headroom. Also available in larger sizes.

BLAW-KNOX SINGLE-LINE HOOK-ON TYPE BUCKETS FOR AVERAGE HEADROOM

There is a type and size of Blaw-Knox Single-Line Hook-On Foundry Bucket to meet a wide range of operating conditions. Blaw-Knox can best give you the competent engineering service that makes possible selection of the bucket best suited to your requirements.

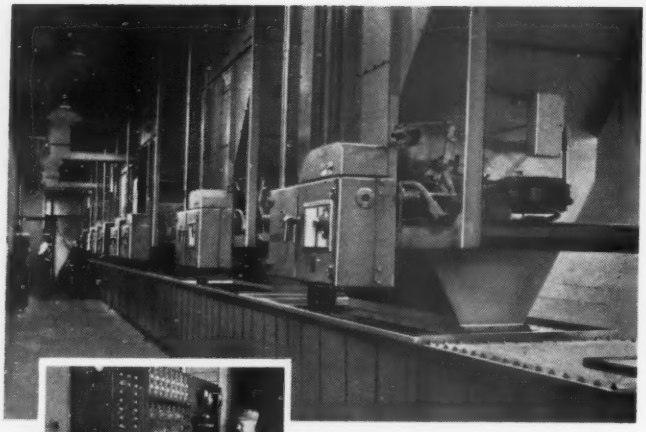
Get complete details from BULLETIN 2232.

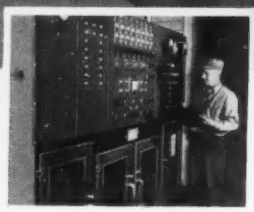
BLAW-KNOX COMPANY
BLAW-KNOX EQUIPMENT DIVISION
Pittsburgh 38, Pa.
Offices in Principal Cities

BLAW-KNOX FOUNDRY BUCKETS

BLAW-KNOX

THE MOST COMPLETE RANGE OF SIZES AND TYPES





WITH RICHARDSON PROPORTIONING EQUIPMENT —

An 800% INCREASE in production per man,

A 90% LABOR SAVING

That's the success story of one Richardson foundry application.

PROBLEM:

To provide a system of control for the batching of sand and core-binder in the production of steel castings; to coordinate batching machinery with the timed discharge of the automatic scales; to provide infallible electric and mechanical checks to assure immediate stoppage of cycle when any phase of operation is incorrect.

SOLUTION:

A materials handling system consisting of 9 bins, 8 automatic scales, 1 collector conveyor, 1 swivel spout, liquid meters, master control panel, 2 skip hoists, 2 mullors, and reject plows. All weighing and control equipment designed, manufactured and installed by Richardson.

In such a formulating system, using the Richardson equipment specified, G-E engineers in the Everett, Mass., Foundry were able to achieve the outstanding results mentioned above. Sand formulation is now a strictly controlled operation approaching full automation not only in function but in quality control as well. A single operator at a panel board can remotely initiate, sustain, change, or interrupt batch formulation merely by adjusting electric controls. Major advantages of a Richardson system—in addition to increased capacity, labor savings, and quality control—are greater flexiblity, material savings, decreased waste, and easier maintenance.

Richardson engineers are specialists in materials handling by weight . . . have designed feeding, weighing, proportioning and conveying systems for practically all the processing industries. For any problem in materials handling by weight, look to Richardson for the economical, efficient solution.

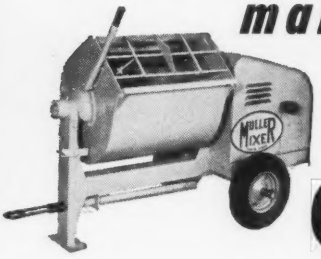
Feeder-Weighing Systems of All Types. Automatic Bulk Weighing Hopper Scales, Including Conveyor-Feed Types —Continuous Feeder-Weighers—Automatic Bagging Scales —Bag-Sewing Conveyors—Packers—Process Control Panels. *Branch Offices in:* Atlanta • Boston • Buffalo • Chicago • Cincinnati • Detroit • Houston • Memphis • Minneapolis • New York • Omaha • Philadelphia • Pittsburgh • San Francisco • Wichita • Montreal • Toronto • Havana • Mexico City • San Juan

Richardson

MATERIALS HANDLING BY WEIGHT SINCE 1902

1701

BETTER CORES *make* BETTER CASTINGS



You can save time and money and make better cores with the Muller New 3½ Cubic Foot Core Sand Mixer. It mixes 250-300 pounds per batch. Better cores mean better castings. This new, labor-saving Core Sand Mixer will "buy itself" out of savings in a short time.

PRICE: $356.00 complete with 1½ H. P. Electric Motor ready to plug in, F. O. B. Metuchen, New Jersey.

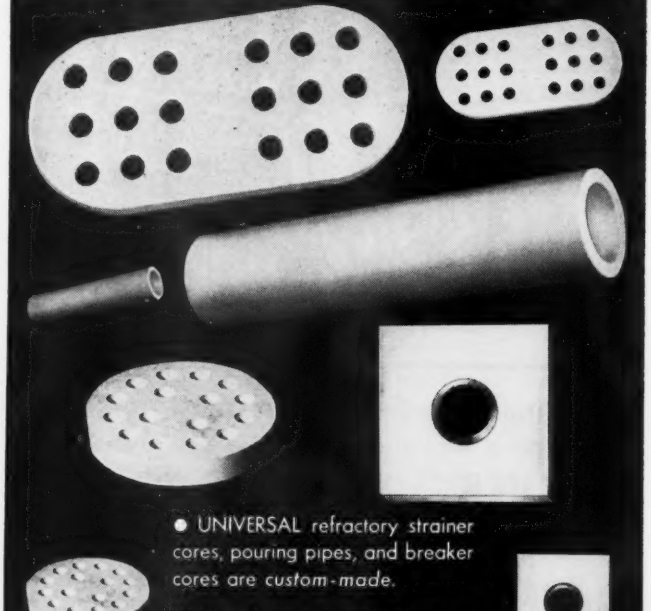
This Mixer is also available in 2, 6, 6 to 8, and 9 Cubic Foot sizes.

MULLER MIXER

MULLER MACHINERY COMPANY, Inc.

Metuchen 14, N. J. Cable Address: MULMIX

UNIVERSAL *REFRACTORY FOUNDRY SUPPLIES*



• UNIVERSAL refractory strainer cores, pouring pipes, and breaker cores are *custom-made.*

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GLUTRIN
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For
CORE WORK, SAND FACINGS, SPRAYS

Write for pamphlets giving detailed information. Both materials carried in stock by America's foremost foundry jobbers

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(Established 1905)

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(Established 1915)

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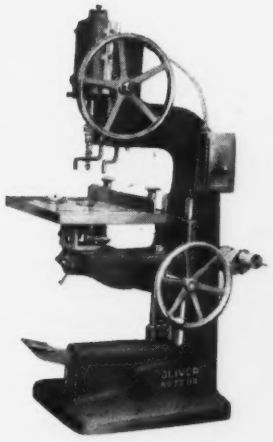
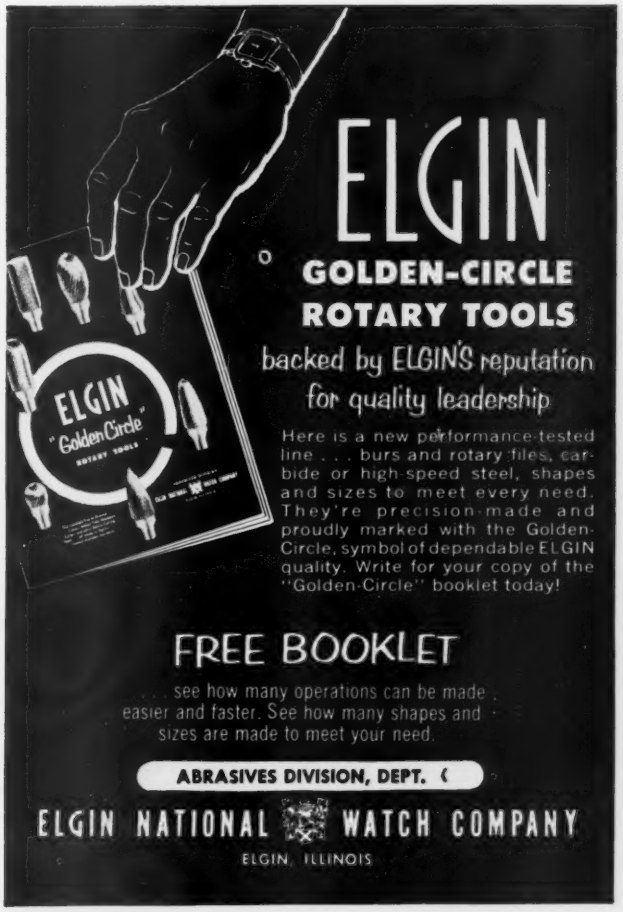
Do your patternmakers need the versatility and capacity of this "OLIVER" Router-Borer? It will pay off quickly!

- For rapid, accurate boring, routing or light shaping, this "Oliver" is a valuable time-saver.
- It smoothly bores a hole up to 2" diameter, up to 6" deep, in the center of 36-inch stock.
- Table measures 20" x 24"; has 12-inch vertical adjustment. It swivels completely around. Tilts 45° in any direction.
- This machine is also offered as an efficient Borer only.
- Write for Bulletin 72-DR.



Write for Bulletins on the No. 72DR Router-Borer and No. 72D Borer

OLIVER MACHINERY COMPANY
Established 1890 GRAND RAPIDS 2, MICHIGAN



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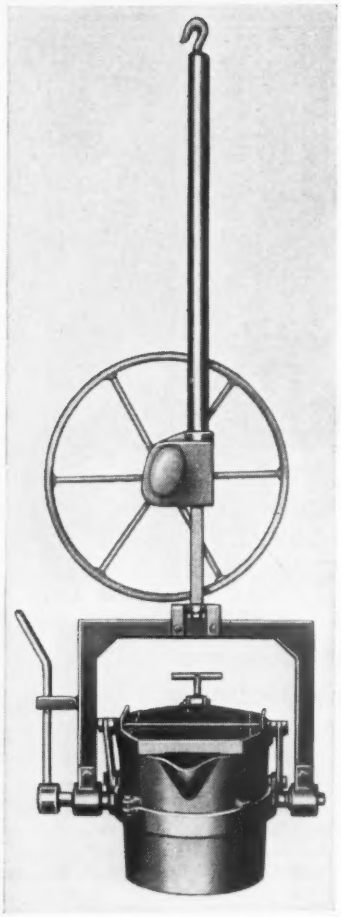
. . . see how many operations can be made easier and faster. See how many shapes and sizes are made to meet your need.

ABRASIVES DIVISION, DEPT. C

ELGIN NATIONAL WATCH COMPANY
ELGIN, ILLINOIS



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a safer, stronger, easier method of distributing molten metal

Let Industrial's NEW Distributor increase your profit with efficient, safe operation from a well located mono-rail system. One man, one hand control makes it possible to pour a larger floor faster and safer than hand pouring operation.

Foundrymen like the "no lift-no carrying" concept of metal handling and it is made safe by an industry proven load brake that holds the maximum load at any position. The effort required to raise this maximum load is the lowest in the industry. For convenience the entire unit swivels at the top hook and the bail connection can be adjusted to your required position. Compact design means less weight with greater strength.

Money saving maintenance is assured by the few moving parts and anti-friction bearings being enclosed, sealed from dirt and easily lubricated.

Available as type D-10—1000 lb. capacity in 2, 2½, 3 foot lifts and as type D-20—2000 lb. capacity in 2, 2½, 3 foot lifts.

Ask your nearby Industrial dealer to help you show a more efficient and profitable foundry operation this year.

Write factory for bulletin D-10.

Foundry Division

Industrial
EQUIPMENT COMPANY

115 North Ohio Street, Minster, Ohio

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PIONEERS IN ENGINEERING, MANUFACTURING & INSTALLING OF

"Uni-Wash"
DUST COLLECTORS

Recirculating Water Type —Compact—Efficient—Proven by Foundry Users

"Scroll-Aire" **CORE OVENS**

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LOOSE PIECE ALTERS SOLID PATTERN SAVES MANY HOURS

When solid patterns must be altered it won't be necessary to rebuild to a split pattern, if a Cerrotru loose piece is made, as shown.

Write for Bulletin F6 to get the details for this and many other timesaving uses for Cerro Alloys.

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SPECIAL
FOUNDRY COKE

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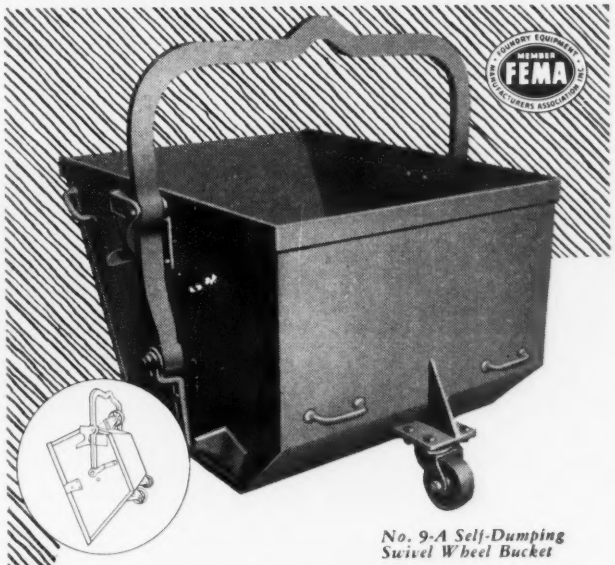

No. 9-A Self-Dumping Swivel Wheel Bucket

PENN BUCKETS...

Careful balancing makes Penn Buckets self-dumping when loaded and self-righting when empty. Welded construction prevents "clinging", makes them empty easily and completely. The swivel wheel increases handling efficiency, too.

WRITE TODAY FOR NEW BULLETIN AND DIMENSION SHEET

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READING, PENNA.

Certified
ABRASIVES
CLEANED THESE CASTINGS QUICKLY!

Really gleam, don't they? That's why "Certified" Samson Shot and Angular Grit cut your blast cleaning costs. They do a *good* job and do it *fast!* That's because "Certified" Abrasives are extra-tough . . . offering a uniformity, controlled analysis and quality unequalled in the production of chilled iron abrasives. The certificate with every shipment is your assurance you're getting the best. Cut your cleaning costs now — switch to "Certified" Abrasives!

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PITTSBURGH CRUSHED STEEL CO.
Pittsburgh, Pa.
FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION MEMBER FEMA
STEEL SHOT & GRIT CO.
Boston, Mass.

WE POINT WITH PRIDE TO THIS AWARD

RIETZ LUMBER COMPANY

IN RECOGNITION of its contribution to and membership on a production team responsible for an achievement unparalleled in industrial history—the building by General Motors in the United States of fifty million motor vehicles.

ON THE OCCASION of the production at the Chevrolet Assembly Plant at Flint, Michigan, this Twenty-third of November, Nineteen Hundred Fifty-four, of GM Vehicle No. 50,000,000.

HARLOW H. CURTICE
PRESIDENT

Merited as one of the material suppliers for the great new line of 1955 General Motors Cars.
We were suppliers of more than 600,000 feet—or 19 carloads—of Sugar Pine pattern lumber used in the development of these fine automobiles. For Kiln Dried Sugar Pine, Northern White Pine and Honduras Mahogany, ask us; we'll ship you 100 ft. or a carload.

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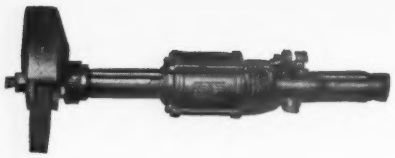
Master Power
HARD CHROMED • PORTABLE PNEUMATIC TOOLS



DO MORE WORK AT LESS COST
because they deliver more power per cubic foot of air consumed, are light in weight for easier maneuverability and they retain their new tool power longer.

ARE PREFERRED BY OPERATORS
because they are lighter in weight, better balanced and designed to reduce shock and be free from vibration.

IF YOUR PROBLEM INCLUDES
chipping, ramming, grinding, buffing, sanding or wire brushing, *write us today for full particulars.*

THE MASTER PNEUMATIC TOOL COMPANY, INC.
ORWELL, OHIO • U. S. A.
SALES • SERVICE • STOCK • COAST TO COAST

HIGH SILICA QUARTZITE PEBBLES
★ ★ ★
R. W. SIDLEY, INC.
THOMPSON, OHIO TEL. 2701

EMPIRE
"THAT GOOD"
FOUNDRY COKE
DEBARDELEBEN COAL CORPORATION
2201 First Ave., North • Birmingham 3, Ala.
Phone 3-9135

GLOSSARY OF FOUNDRY TERMS
Compiled by Ed Bremer, FOUNDRY Metallurgical Editor
This extensive glossary of foundry terms was compiled from a wide variety of sources. Arranged in handy booklet form, it is a valuable reference for every foundryman. *48 pages.* $1.00
PENTON PUBLISHING COMPANY, Book Department
1213 West Third St., Cleveland 13, Ohio

COLOR YOUR CORE SANDS

Modern foundries have found it practical to color their various grades of core sands. This eliminates guesswork and assures the proper use of the required type of core sand for the particular job at hand.

Our laboratories have developed a line of special dyes in a range of colors that have been carefully tested and found suitable as well as economical.

Write us for details and samples.

EATON CHEMICAL AND DYESTUFF COMPANY

1490 Franklin Street Established in the year 1838 **Detroit 7, Michigan**

Canadian Branches: Windsor and Toronto

FOUNDRY

EDWIN S. CARMAN, INC.

LEE ROAD AT MAYFIELD
CLEVELAND 18, OHIO

A COMPLETE FOUNDRY SERVICE

CONSULTANTS

SHORT CUT TO PROFITS

ohio MAGNETS

WELDED AND BOLTED TYPES • ALL SIZES • COMPLETE CONTROL EQUIPMENT • 28 YEARS A LEADER IN MAGNETIC MATERIALS HANDLING.

THE OHIO ELECTRIC MFG. CO. • 5400 DUNHAM ROAD • CLEVELAND, O.

Associate Member Institute of Scrap Iron and Steel, Inc. A-9095

New **Nicol-Rod** *Obsoletes All Others*

FOR WELDING CAST IRONS!

● One outstanding reason why Marquette's new No. 99 Nicol-Rod obsoletes all others is the *ease with which sound, machineable welds can be produced in cast irons at lower cost!* Its ferromolostic coating (special powdered iron) develops a deep-coned arc that is instantly self-starting, that re-ignites without freezing the rod to the work, that establishes an optimum arc length and that maintains a more stable arc even on low, open circuit voltages!

Of equal importance is finished work quality. The weld metal matches the color of the casting, forming a perfect bond that is softer but stronger than the cast iron . . . *and its low coefficient of expansion and contraction ends cracking during cooling!* A new form of hi-bond penetration with flat bead contour is obtained. More footage of weld can be made per electrode with less spatter, less slag and more weld deposit.

For further information contact your Marquette distributor and ask him for a free demonstration.

When It Comes to Welding Come to

MARQUETTE

MARQUETTE MANUFACTURING COMPANY, INC.

307 E. Hennepin Ave., Dept. WE-7, Minneapolis, Minnesota

USE B'A STANDARD OF PURITY

Alkali Fluoborates

Ammonium Fluoborate
Potassium Fluoborate
Sodium Fluoborate

Better Heat Treating

Baker & Adamson Alkali Fluoborates are easily-handled purifying salts which the foundryman can use like precision tools for a wide range of purposes when casting magnesium, or when melting, heat treating or refining aluminum.

Better Castings

When used as a purifying flux in aluminum melting, B&A Potassium Fluoborate improves the mechanical and physical properties of the casting, resulting in increased tensile strength, greater elongation, improved machinability. These results are obtained with the addition of just one to four ounces per hundred pounds of metal.

Excellent Oxidation Inhibitors

In magnesium casting, B&A Alkali Fluoborates are used with both green sand and core sand to provide a protective atmosphere which prevents oxidation. Foundries using these fluoborates have obtained better castings with fewer rejects. Also, core making is easier and the resulting cores are faster to collapse and easier to shake out.

Write or call your nearest B&A Office for full information. Shipment is fast from the nation-wide chain of B&A distributing stations.

GC Allied Chemical

BAKER & ADAMSON® *Fine Chemicals*
GENERAL CHEMICAL DIVISION
Allied Chemical & Dye Corporation
40 Rector Street, New York 6, N. Y.

Offices: Albany* • Atlanta • Baltimore* • Birmingham* • Boston* • Bridgeport* Buffalo* • Charlotte* • Chicago* • Cleveland* • Denver* • Detroit* • Houston* Jacksonville • Kalamazoo • Los Angeles* • Minneapolis • New York* • Philadelphia* Pittsburgh* • Providence* • St. Louis* • San Francisco* • Seattle • Kennewick* and Yakima (Wash.) • In Wisconsin: General Chemical Company, Inc., Milwaukee
In Canada: The Nichols Chemical Company, Limited • Montreal* • Toronto* • Vancouver*
SETTING THE PACE IN CHEMICAL PURITY SINCE 1882
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FROM IDEA . . .

TO FINISHED INSTALLATION

ENGINEERED FOR YOUR SPECIFIC REQUIREMENTS

Most of America's leading manufacturers are well aware of the many advantages of automation. The question is no longer "Should we automate?"—competitive market conditions have answered that! The problem now becomes, "To what *extent* is it practical and profitable to automate – and how far should we go *now?*

The Service Conveyor Company can help you determine the solution to this problem—a solution that will meet all your operating and cost requirements. Drawing upon its twenty-five years of experience in the field of practical automation, Service can plan, design, engineer, build and install the *right* automated facilities and equipment for your plant!

Service—engineered automation does not mean installing *all* new equipment. Service utilizes your existing facilities – supplementing them with the additional equipment required—to achieve continuous, integrated production flow. Discuss your automation plans in complete confidence with a Service engineer. Write for full details today!

SERVICE CONVEYOR CO.
7764 BRYDEN AVENUE
DETROIT 10, MICHIGAN
DEPT. 47

Engineered Automation—Ideas, Methods and Experience

CLASSIFIED ADVERTISING

Help Wanted

HELP WANTED

The following positions are available for the right personnel in a long established northwest foundry producing steel castings:

1. WELDING ENGINEER AND ASSISTANT CLEANING DEPARTMENT FOREMAN. Must be thoroughly versed in all procedures for preparation of and welding steel castings.

2. ASSISTANT CHIEF INSPECTOR. Applicant must have thorough knowledge of foundry operation as well as knowledge of quality standards for steel castings.

3. ASSISTANT FOUNDRY ENGINEER. This job consists of the layout and engineering of gating and risering systems for steel castings and following same through production.

All three jobs offer excellent future opportunity for the proper personnel.

BOX 617, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

ALUMINUM CASTING ENGINEER

If you are interested in joining a Chicago foundry organization that is ambitious, aggressive and definitely expanding its facilities, and if you have had experience in foundry engineering on aircraft quality aluminum castings, we would like to hear from you. Please submit a brief resume. Salary will depend upon qualifications. All replies will be held in strict confidence.

BOX 612, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY TECHNICIAN

Large, modern nonferrous foundry in East is seeking a man experienced in gating, risering and general foundry techniques of large aluminum alloy castings. Must hold close tolerances and produce X-Ray quality. Some melting experience desirable, in all aluminum alloys. Salary open. Send complete resume of experience and education.

BOX 604, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

METALLURGICAL OR MECHANICAL ENGINEER

Malleable foundry in Mexico desires engineer for Sales contacts. Must have experience in malleable operations and production. Knowledge of Spanish advantageous but not essential. Write full details, personal background, resume of experience, references and salary.

BOX 626, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY METALLURGIST

Experienced in foundry practice, heat treating, and induction furnace melting. Please send complete data with letter. Replies confidential.

BOX 614, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY SUPERINTENDENT

For medium-sized nonferrous jobbing foundry near Detroit, Michigan. Must be thoroughly experienced in molding, gating, coremaking and melting procedures. Please send complete data and salary expectations with first letter. Replies confidential. Address: Box 582, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MOLDING AND POURING FOREMAN

Steel foundry experience with squeezer and pin lift work. Jobbing shop in Los Angeles area. Give complete personal background, work experience and salary requirements. Address: Box 613, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Help Wanted

STEEL FOUNDRY SUPERINTENDENT

Experienced in all phases of steel foundry practice, using electric melting furnaces, making low alloys, carbon and high manganese castings in light and heavy sections, about 350 tons monthly capacity, located in Ohio.

Necessary to know squeezers, sand slinger and jolt molding, hand and blower core making, sand preparation and other equipment used in modern steel casting manufacturing.

For the right man who can demonstrate ability and progressiveness this could be the start to sure promotion.

In first letter give personal history, experience and starting salary expected.

Personal interview will be arranged for qualified applicants.

All replies will be held confidential.

BOX 596, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

PRODUCT MANAGER

Person to handle sales program, set up and assist jobbers, and develop a direct mail and advertising program. Product group includes fine quality replacement wear parts for Shot Blast Equipment, Sandslingers, and other such foundry or metal cleaning equipment.

Position involves traveling. Person must be aggressive and proven in sales ability. Desired age: 25-40. Include a recent photograph. Write full details to:

BOX 609, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

SAND TECHNICIAN

Modern, nonferrous foundry is seeking a technician with initiative and specific knowledge of aluminum and magnesium molding and core sands, resin binders, inhibitors, and other sand additives. Must be able to operate latest sand test equipment and interpret data obtained. Send complete resume and salary requirements.

BOX 605, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

ELECTRICAL MAINTENANCE FOREMAN

Age 25-35. B.S.E.E. degree desirable. Familiar with steel foundry or steel mill problems and practices. Desired for permanent position in a leading Eastern steel foundry. This is not just another job. If you have ability and can think, opportunity exists. Send resume and salary expected.

BOX 546, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

PROJECT ENGINEER

Specialized gray iron foundry Mid-Ohio City of about 80,000 population. Various non-repetitive production problems including research and development under supervision of Vice-President. Recent graduate foundry option Industrial Engineer with some shop experience. Replies confidential. Write full details personal background, resume of experience, references and salary expected. Address: Box 499, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

METALLURGIST

A medium-sized progressive manufacturer of oil field equipment, located in a small city in central Ohio, needs metallurgist experienced in gray iron casting and foundry practice. All replies confidential. Write stating full qualifications and salary requirements. Address: Box 615, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CORE ROOM SUPERVISOR

Experienced in production of cores for Carbon and Alloy Steel Foundry. Must have experience in handling personnel. Splendid opportunity with a progressive well established organization in Eastern Pennsylvania. State salary and qualifications. Address: Box 624, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Help Wanted

PATTERN RIGGER

To work in Los Angeles, California. Must be fully qualified in the gating and risering of patterns for malleable iron castings. Layout and supervise work of pattern repairmen. Write, giving age, experience, references.

GENERAL METALS CORPORATION
5701 SOUTH BOYLE AVENUE
LOS ANGELES 54, CALIFORNIA

PRODUCTION FOREMAN

Large malleable foundry has opening for production foreman thoroughly familiar with molding, gating and risering of malleable iron. Send resume including salary desired.

BOX 554, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

ENGINEERS AND DRAFTSMEN

Experienced in foundry equipment and layout. Send resume of experience, references and recent snapshot.

BOX 593, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

EXPERIENCED PLANT MANAGER

For small progressive alloy steel foundry in Michigan. Technical background preferred but not necessary. Splendid connection for right man.

BOX 587, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

ENGINEERS-DRAFTSMEN

Nationally prominent consulting engineering firm has openings for additional men in its Plant Engineering Division. Applicant should be experienced in design and layout of Materials Handling and allied equipment for foundries and other heavy industry. Two experienced Drafting Supervisors are also required. Submit full details in reply. All replies confidential.

BOX 603, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY FOREMAN

Experienced in molding and pouring in Steel Foundry. Opportunity with a progressive organization in Eastern Pennsylvania. State qualifications and salary. Address: Box 625, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

PLANT MANAGER

Must be experienced in foundry and diecasting operation. Connecticut location. Give complete resume. Replies confidential. Address: Box 602, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

GRINDING FOREMAN

Midwest foundry. State qualifications, references, and salary. Address: Box 598, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

HELP WANTED

Experienced cleaning room foreman, gray iron foundry making small castings. Address: Box 607, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Help Wanted

METALLURGICAL OR MECHANICAL ENGINEER

Under 35 years of age, with iron foundry experience for work on special irons. Traveling required. State salary and qualifications.

BOX 611 FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

CORE ROOM SUPERINTENDENT

Experienced in cores for water jacket cylinders, heads and manifolds; also general production cores. Well established foundry in Wisconsin producing sixty to eighty tons of cores daily. Give full details of personal background and experience. State salary expected.

BOX 627, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY SUPERINTENDENT

For cast iron sanitary, bronze, brass and aluminum foundry. Excellent salary, permanent position and unlimited opportunities, with a fast growing organization. This job is for our Canadian Plant. Address: Box 608, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

FOUNDRY ENGINEER

Want permanent position in the Kansas City or St. Louis area. Twenty-five years' experience in the engineering, maintenance and design of gray iron malleable and brass foundry facilities. Familiar with all phases of foundry operations from raw materials to finished castings. Also qualified to prepare comprehensive plant survey reports, with plant layouts, specifications and estimates on future proposed modernization, mechanization or automation programs. Address: Box 599, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANAGER OR PLANT SUPERINTENDENT (Canada)

Experienced in all phases of foundry operation and management. Twenty years' gray iron experience including pattern shop, machine shop, enameling plant, plant layout, design, cost, quality control, timestudy, purchasing and sales. Qualified to assume high responsibility. Looking for a greater opportunity. Presently employed in this capacity. Address: Box 595, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT OR GENERAL FOREMAN

Desire position with medium-sized jobbing or production shop. Gray iron or nonferrous. Practical man with thirty years' experience. Well versed in every department. Western or Central New York preferred, but not essential. Address: Box 574, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

METALLURGIST

Four years' experience in gray iron as melting supervisor, sand control and quality control. Degree, B.S. in Metallurgical Engineering. Age 33. Desire position of responsibility offering opportunity for advancement. Address: Box 600, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY EXECUTIVE

Thoroughly experienced in the management of gray iron production or jobbing foundries. Qualified to show you a highly efficient and low cost operation. If you are interested, Address: Box 556, FOUNDRY, Penton Bldg., Cleveland 13.

INDUSTRIAL ENGINEER

Thorough knowledge of practical foundry operations, methods, equipment and layout. Have set up production control department, standard department, incentive system and pricing system. Address: Box 594, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOREMAN OR SUPERINTENDENT

Thirty-three years' practical experience, 20 years as supervisor in both jobbing and high production shops. Experienced in rigging and gating for fast production and quality castings, both gray iron and nonferrous metals. Addess: Box 588, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SYNTHETIC SAND SPECIALIST

Solid practical and theoretical background. Desire position with ferrous foundry or progressive supplier in the development of new green sand processes. Address: Box 622, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Employment Service

FOUNDRY PERSONNEL SPECIALISTS
National Placement and Procurement of

GENERAL AND PLANT MANAGERS, PLANT SUPERINTENDENTS, FOREMEN—ALL DEPARTMENTS, METALLURGISTS, ENGINEERS, CONTROLLERS, ACCOUNTANTS, SALESMEN, SALES MANAGERS, PERSONNEL DIRECTORS, PURCHASING AGENTS.

Confidential Inquiries Invited
From Employers and Qualified Applicants.
For Fast Competent Assistance Contact

DRAKE PERSONNEL, INC. HARRISON 7-8600
JOHN COPE, DIRECTOR 220 SOUTH STATE ST., CHICAGO, ILL.

Positions Wanted

FOUNDRY FOREMAN

Twenty-nine years' foundry experience, past sixteen in supervisory capacity. Can handle coreroom and molding floor. Cost conscious, good labor relations, high production caliber. Will relocate anywhere. Address: Box 573, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

ENGINEER-SUPERVISOR

Degree Metallurgy, experience in all phases foundry. Desire position involving gating and risering. Available for temporary work also; consultant. Age 40. Address: Box 620, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

Position as Cleaning Room Superintendent. Have had years of experience in all classes of steel castings and alloys. Address: Box 610, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

REPRESENTATIVE

Established gray iron foundry representative would like to represent a good production electric steel foundry in Detroit and Toledo area. Address: Box 619, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY ENGINEER

Desire staff or live management position with large concern. Executive assistant situation preferred. Familiar with all cast metal. Age under 40. Address: Box 618, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

EXECUTIVE

Experienced in all phases of foundry operations and management. Thorough knowledge of machine shop, pattern shop, engineering, metallurgy, foundry cost and estimating, sales and industrial relations. Registered mechanical engineer, 25 years' experience foreman, superintendent, general manager and vice president. Foundry running 150 tons daily. Address: Box 628, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Representatives Wanted

AGENTS

To sell replacement wear parts for Sandslingers, parts to fit "Wheelabrator" Shot Blast Equipment, and for similar wear applications. Product group is already established and accepted. Need agents familiar with foundry and metal cleaning industry. Attractive commission arrangement. No inventory. Openings in South and Mid-West.

SPECIAL PRODUCTS DIVISION
LATROBE STEEL COMPANY
LATROBE, PENNSYLVANIA

SALES REPRESENTATIVE WANTED

America's largest dealer in used and rebuilt foundry equipment is now looking to establish a representative in the State of Texas. Prefer man now calling on the foundry industry with established customer relations.

BOX 623, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

OHIO TERRITORY

Open for distribution of product used in gray iron and malleable iron foundries. Aggressive sales effort will yield attractive profit. Warehouse facilities necessary. Producer will assist in expanding established market. Address: Box 565, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Representatives Wanted

SALES REPRESENTATIVE

For a well established nonferrous alloy company. We make such alloys as Copper Shot, 50/50 Copper Nickel Shot, Manganese Copper, Aluminum Bronze Hardeners, Manganese Bronze Hardeners, Deoxidizers and Degasifiers, 5% Titanium Aluminum, Silicon Aluminum, Manganese Aluminum and many similar alloys. We have excellent territories open with active accounts. Our plant is located in the Buffalo, New York area. Address: Box 584, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Wanted-To-Buy

WANTED

One electric arc steel making furnace 1-2 tons nominal capacity with or without transformer and auxiliary equipment.

Also steel making induction furnace with nominal capacity of 100-300 lbs.

Specify condition, age and price.

Address replies to:

VANADIUM CORPORATION OF AMERICA
BRIDGE STATION
NIAGARA FALLS, NEW YORK
ATTENTION: MR. R. A. DAVIDSON, CHIEF ENGINEER

WANTED

Core Oven, drawer Type, oil fired with controls in good shape.
One 3½ cubic ft. Wheelbarrow, type Mulbaro, with extra barrow.
One Bell Prime Mover or Moto-Bug, late model. State age, condition, and price.

FLORIDA FOUNDRY & PATTERN WORKS
3737 N.W. 43rd STREET
MIAMI 42, FLORIDA

WANTED

Vibrating Conveyor
Bucket Elevator
Sand Storage Bin
Measuring Hoppers

PIONEER FOUNDRY & MANUFACTURING CO. INC.
P.O. BOX 118
GILBERTVILLE, MASS.

WANTED TO BUY

FOUNDRY CHEMICAL LABORATORY EQUIPMENT

STANDARD ELECTRIC STEEL CASTINGS CO.
221 EAST CHASE ST.
SPRINGFIELD, MISSOURI

MACHINERY WANTED

Screens, Simpson Mixers, Riehle Compression Testing Machines, Pulverizers, Grinders, Conveyors. Address: INSTRUMENT SERVICE COMPANY, INC., HOBOKEN, NEW JERSEY. BA 7-0600.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address Box 578, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CLASSIFIED ADVERTISING

Foundries For Sale

FOUNDRIES FOR SALE

Established going gray iron foundry in Central Wisconsin. Fully equipped; manufacturing own line and general jobbing. Capacity up to ten tons per day. Over $70,000 value. Can be purchased for less than half. Principals only. Address: Box 531, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOR SALE

Small but completely mechanized soil pipe foundry, located near large city. Address: Box 601, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SMALL FOUNDRY FOR SALE

Well-equipped foundry in Eastern Pennsylvania. Has overhead crane, cleaning equipment. Plenty of adjacent land. On railroad. Address: Box 572, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOR SALE OR LEASE

Well equipped brass and aluminum foundry in central Indiana, with living quarters. Address: Box 621, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

For Sale

FOR SALE

TURBO BLOWERS WITH MOTORS

CFM	PRESS.	MAKE	CFM	PRESS.	MAKE
6000	32oz.	Ing.-Rand	380	16oz.	No. Am.
4700	32oz.	Ing.-Rand	340	20oz.	A-B
4050	16oz.	No. Am.	320	12oz.	Spencer
2700	16oz.	Spencer	140	32oz.	Hoffman
2500	7oz.	Sturt.	9000	6"SP	Northern
1150	20oz.	No. Am.	3420	8"SP	N.Y.
800	13oz.	Buffalo	2500	½"SP	American
525	48oz.	Ing.-Rand	2344	2"SP	Clarage
500	12 oz.	Buffalo	1100	4½"SP	Bayley

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVE.
CLEVELAND 14, OHIO

MOTORS — GENERATORS
TRANSFORMERS
Unused — Rebuilt
WORLD'S LARGEST INVENTORY
ELECTRIC EQUIPMENT COMPANY
Phone Station Collect GLenwood 6783
P. O. Box 51 — Rochester 1, New York

FOR SALE

Heller Universal type 26" cold saw, excellent condition, used little, complete. Wired 220/3/60. Includes Heller automatic saw sharpener and ten saws.

BOX 606, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

STEEL MELTING FURNACES

One 350 lb. cold charge. Never used. One 60 lb cold charge. Slightly used. One 17 lb. Model PT. Slightly used. All furnaces Detroit Rocker Indirect Arc with spare shells. Complete with meter panels, switches, and transformers. All wired for 220-volt 60-cycle. Will sell or trade for M. G. Induction unit.

FALLON INDUSTRIES
25800 GROESBECK HIGHWAY
ROSEVILLE, MICHIGAN
PH: PRESCOTT 7-2500

FOR SALE

1—Tinius Olsen 100,000# Universal Compression Testing Machine
1—Magnaflux Demagnetizing Unit
Simpson Sand Mixers 18" dia. Laboratory #0, #1, #1½, #2, #3.
Miscellaneous: Screens, Pulverizers, Grinders, Conveyors—all types, Tyler Rotap Screens, etc.

OUR 38th YEAR

CONSOLIDATED PRODUCTS CO., INC.
66 BLOOMFIELD STREET
HOBOKEN, NEW JERSEY
HO 3-4425 N.Y. TEL. BA 7-0600

For Sale

FOR SALE
COMPLETE—LIKE NEW—IMMEDIATE DELIVERY

G. E. ROLLER HEARTH 850 KW—1650 deg. F. 5' wide, 18" high, 35' long—80' cooling.
G. E. ROLLER HEARTH 465 KW—1650 deg. F. 5' wide, 18" high, 20' long—40' cooling.
G. E. PUSHER 240 KW—1650 deg. F. 5' wide, 24" high, 22' long—Quench Conveyor.
4000 CFH EXO GENERATOR with each above furnace.
YOUNG BROS. GAS RECIRC. CONVEYOR BELT—1000 deg. F. 8' wide, 24" high, 45' long. NEW.
UDYLITE DIPPING MACHINE, 1-12 Station Rotary Type.
UDYLITE 1-14 Station Rotary Zinc Plating Unit.
DRYING SYSTEM OVEN 450 deg. F—13' W, 7' H, 64' L.
DRYING SYSTEM OVEN 150 deg. F—10' W, 9' H, 52' L.
500 CFH Westinghouse Endothermic Generator.
SURF. COMB. GAS BOX 30" W, 18" H, 36" L. 1800 deg. F.
MARSHALL BLOW PIPE VENT HOOD.

PAPESCH & KOLSTAD, INC.
10707 CAPITAL AVE.
OAK PARK (DETROIT 37) MICH.
LINCOLN 11100.

WE—BUY—SELL—TRADE
FOR SALE

15" Continuous Wheelabrator	$4,500.00
27 x 36 Wheelabrator (Iron Belt)	2,500.00
#2 Wheelabrator Table 8' diameter with 8 auxiliary tables 28" diameter	2,500.00
Pangborn 6' Rotoblast Table with 8 auxiliary tables	3,500.00
Pangborn 6' Rotoblast Table with flat single table	2,000.00
Pangborn ES 421 Shell Blasting Machine (Like New)	3,500.00
Vapor Blasting Machine	800.00

Dust Collectors all sizes 300 C.F.M. to 14,000 C.F.M.
Also Pressure Tanks, elevators, blowers, motors all types and sizes.

ATTENTION CANADIAN BUYERS

We have just purchased another lot of 42 x 48 wheelabrators some of which are in Canada. These can be purchased duty free. Some are in excellent condition and can be seen in operation. Priced to sell from $950.00 to $2,500.00

DIAMOND SAND BLAST INC.
5654 WEST JEFFERSON AVE.,
DETROIT 9, MICHIGAN
PHONE VINEWOOD 3-6750.

FOR SALE

Moulders' Friend Sand Cutter, 60" reel, 220/440 V, 60 Cycle, 3 Phase Motors, Serial No. 5003, extra brush and shipping crate. Excellent condition. Can be inspected under power.

SOMERSET FOUNDRY & MACHINE CO.
SOMERSET, PENNSYLVANIA

FOR SALE

CORE BLOWER, Federal San-Blo, Pulsator Model 40-P-1 Serial No. 253-319. Complete with Pre-fill Timer. 110v/60 cy. Never used in production.

THE TRUMBULL BRONZE COMPANY
WARREN, OHIO

FOR SALE

72—24 x 2 x 2 37C-16 S5V Norton grinding wheels
48—24 x 1½ x 2 37C-16 S5V Norton grinding wheels
1—24 x 3½ x 2 37C-16 S5V Norton grinding wheel

Surplus stock. Make offer.

OHIO MALLEABLE DIVISION
The Dayton Malleable Iron Co.
COLUMBUS 16, OHIO

SAND DRYER FOR SALE

1—4' DIA. 20' LONG BARTLETT-SNOW STYLE M ROTARY SAND DRYER, SELF CONTAINED WITH GAS BURNER, CYCLONE, STEEL FRAME. LIKE NEW $3900.

DARIEN CORP.
60 EAST 42nd ST.
NEW YORK 17, NEW YORK

For Sale

FOR SALE

MOLDING MACHINES
1—Herman, Jolt, Rollover Draw, 6000#, 40" x 60" table.
1—Herman, Jolt Stripper, 48" x 54" table.
2—International, Jolt, Rollover Draw, 24" x 10G, Stationary.
2—International, Jolt, Rollover Draw, 20" x 8-G, Portable.
1—SPO #305 Jolt Stripper.
2—No. 275 Osborn jolt squeezers.

CORE OVENS
1—Coleman Recirculating 3 section with 5 drawers per section. Gas fired.
1—Coleman Recirculating 4 section with 5 drawers per section. Gas fired.

BLOWERS FOR CUPOLAS AND FURNACES
1—Connersville Rotary Blower, 3500 CFM.
2—#7½ Roots rotary blowers—27 x 81—14000 CFM.
2—Connersville Rotary 14" x 27" HD, 2750 CFM at 5# press.
1—Connersville rotary blower 22 x 66 45 cu ft. per revolution 9000 CFM.
Maxon-Premix Blowers for Gas ¼ to 1 HP.
2—5 HP 20-oz. Spencer Turbine Blowers.
2—2 HP 20-oz. Spencer Turbine Blowers.

METAL MELTING EQUIPMENT
1—1000# open flame brass melting furnace, gas fired.
1—Hausfeld Stationary Brass, oil or gas burner, 200# cap.
1—Hausfeld Tilting crucible, gas, 250# Al, Cap.
1—Hausfeld 2000# aluminum capacity furnace, barrel type, open flame, oil fired.

MISCELLANEOUS
1—Pangborn 1 to 4 nozzle air blast generator, complete.
1—Sullivan, 2 stage compressor, 14-8¾ x 10, 75 HP.
1—Sly Tumbler 24" x 40".
1—International SB-11 core blower.
2—Pangborn cloth screen collectors, 2 HP.
1—Stoney crane type shakeout.
1—NC-4 Royer sand separator.
1—#1 Demmler core blower.
1—#16 Roto-clone unit complete.
Complete stock of rebuilt mill and dust exhaust blowers.

CLIFTON MACHINERY COMPANY
1023 W. SIXTH ST. CINCINNATI 3, OHIO

FOR SALE

Osborn Roto-Lift
Molding Machine
Model No. 3161-S

JARDINE BRONZE FOUNDRY, INC.
BALDWINSVILLE, NEW YORK
PHONE 508

FOR SALE

DEMMLER #4 Core Blower, used four months, excellent condition. Subject prior sale $600. Detroit District. Address: Box 616, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FURNACES FOR SALE

Ten used heat treating furnaces and two 7-ton gantry cranes. Good condition, priced to sell. Address: BAER STEEL PRODUCTS, INC., BOX 1428, BOISE, IDAHO.

FOR SALE

1 Pangborn Dust Collector—Type 435CH2 with Spark Arrestor, Area 1080 Sq. Ft. Capacity 3240 CFM—220 V Motors, Fan and Controls Complete. Age about 15 years. Used very little, very cheap. Address: KEEN FOUNDRY COMPANY, GRIFFITH, INDIANA.

GUARANTEED MACHINERY & EQUIPMENT VALUES . . . . . .

AIR & ELECTRIC HOISTS

22—INGERSOLL-RAND Air Hoists, 700 lbs capacity through 10,000 lbs, all sizes and models, latest type, with trolleys or hooks for hanging.
1—COMET 1000 lbs capacity, electric 220V.
1—DETROIT 5 ton cap. Model LHR.
1—ELECTRO-LIFT 3000 lbs cap. 4 HP
1—SHAW-BOX Load Lifter Jr. 1000 lbs

CORE BLOWERS

1—#1 DEMMLER.
2—CB-400 CHAMPIONS.
2—#91 OSBORN.
2—#193 OSBORN.
1—#192 OSBORN.
6—MILWAUKEE — Taccone Model A-3, Bench Type.
5—REDFORD #1 Bench Type, air clamping & cartridges.

CUT-OFF SAWS & STRAIGHTENERS

1—TESSMER Model H Sprue Cutters.
1—CLIMAX #2A Wire Straightener.
1—AMERICAN Type D Rod Straightener & Shear, ¾" shear, 1¼" straightener.
1—DEWALT Model Me2V Foundry Type Cut-Off Saw with 10 HP motor.

CONVEYORS—ROLLER-BELT—TROUGH

1—FARQUHAR 18" x 35' portable Trough.
1—FARQUHAR 18" x 19' Car Unloader.
5000'—MATHEWS Gravity Roller Conveyor, 10"—16"—18" width rollers, standard & heavy duty, FOUNDRY TYPE.
1—LINK-BELT Overhead Conveyor, 100' track, chain, trolleys, curved, motorized.
700'—LINK-BELT & PALMER BEE Trough & Flat idler belt conveyor 18", 24" widths, various lengths complete with belting, motor drives some with magnetic pulleys.

CUPOLA & FURNACES BLOWERS

1—INGERSOLL-RAND Centrifugal Type FS-367 with 100 HP motor.
7—Furnace Blowers 1-3-5-7½ HP, 16 oz.

CORE OVENS

1—FOUNDRY EQUIPMENT 4 Compartment 6' x 8' x 10' each, gas fired with controls, recirculating, like NEW.
1—INDUCTION HEATING Dialectric Model M-800A, 600 lbs. per hour used only 300 hrs. Like NEW.

DUST COLLECTORS & ROTO-CLONES

1—AMERICAN AIR FILTER No. 14 Type W arrangement "C" with sludge ejector.
1—AMERICAN AIR FILTER No. 27 Type W arrangement "C," with sludge ejector.
1—AMERICAN AIR FILTER Type N, Size 10 with No. 14 Roto-Clone & sludge ejector. Grinding Bench type.

HEAT TREAT & ELECTRIC MELTING FURNACES

1—LINDBERG Model 4860GH, Cyclone Type Gas fired, with all controls.
3—DETROIT Type AA Rocking 1500 to 2000 lbs, w/400 KVA Transformers.
2—DETROIT Type AA Rocking 750 to 1000 lbs, w/250 KVA Transformers.

GAS & OIL FIRED FURNACES

3—LINDBERG-FISCHER MNP Size 2400 lbs gas or oil fired, motorized, complete.
1—LINDBERG-FISCHER MNP Size 225 lbs, gas or oil, w/motor-blower etc.
2—LINDBERG-FISHER Type BBI, 400 lb crucible type, hand tilt, gas or oil.
1—STROMAN Model U, 600 lbs Reverberatory, tilting, gas or oil fired.
2—STANDARD #30 & #150 Crucible, Stationary, gas or oil, w/motor-blower.
11—HAUSFELD #200 Crucible, stationary, gas fired, NEW 1952.
1—STROMAN Model NP, 125-175 Crucible, Mechanical Tilt, gas fired, with motor & blower & electrical tilt mechanism.
2—CAMPBELL-HAUSFELD Type IPNT Iron Pot Type, 2000#'s Cap. gas or oil fired.

G. E. INDUSTRIAL X-RAY

Model KX 10, Type 1, 115 volts, 50/60 cycles, 13 amps. Serial 425456.

GRINDERS—SWING—SNAGGING—STAND

2—FOX #5 High Speed Stand, wheel 24" x 3"—10 HP motor.
1—FOX #7 High Speed Stand, wheel 30" x 3"—15 HP motor.
1—HAMMOND WR-1 Double End Snag, wheel 24" x 3"—10 HP motor.
1—QUEEN CITY #100 Double End Disc.
1—U. S. Electric Swing Frame, 15 HP, 2 speed, wheel 24" x 3" x 12".
6—U. S. ELECTRIC #65 Snag Grinder, 15 & 20 HP models—4 speeds, max. wheel 30" x 4".
2—U. S. ELECTRIC #64 Snag Grinders, 7½ hp, adjustable speed, wheel 14" x 3".

LADLES & POURING DEVICES

6—INDUSTRIAL Lip Pour 24" x 24" rated 1600 lbs. enclosed Timken Gearing.
6—MODERN Model FA-9 Pouring Devices with ladles, trolleys & tilt devices.
2—MODERN Mixing Ladles, 40" x 60", on trunnions, geared, covered, lined.
4—MODERN 1500 lb. Cylindrical Type, 29" x 30", w/bails, covers & stands.
10—WHITING Models 1000 & 2000 Pouring Devices w/400 lb ladle, hand tilt.
3—WHITING 275# Cylindrical Type V-bail, 19" diam x 16" length, covered.

MOLD CONVEYOR

1—PALMER BEE with 104 cars size 42" x 72" tops, with motors and drives.

INDUCTION MELTING—HEAT TREATING

1—LEPEL 30 KW Spark Gap Converter w/controls & 20 lb furnace & stand.
1—300 KW G.E. alternating current generator, 800 volt, 3600 RPM, 1 phase complete with 450 HP G.E. motor and control panel.

MOLDING MACHINES

1—DAVENPORT #28 RO Jolt Rollover & Pattern Draw 30" x 40" table, 12" draw.
2—INTERNATIONAL RES Jolt Squeeze Rollover Draw, Size 15" x 8" draw.
1—INTERNATIONAL PKL Jolt Squeeze Strip, 18" x 24" table, 6" draw.
1—INTERNATIONAL LP-10 Jolt Pin Lift.
5—OSBORN #275J Jolt Squeezers, 10" cyl.
1—MILWAUKEE No. 125-3 Jolt Squeeze Pin Lift, table 21" x 27", 1200# jolt cap, 8" draw.
1—DAVENPORT #24SA Jolt Rollover & Pattern Draw, 24" x 38" Table, 12" Draw, 1000#.
2—OSBORN #710J Jolt Squeeze Pin Lift, 16" x 25" table, 6" draw, 10" squeeze
1—OSBORN No. 563-9 Jolt Pin Lift 55" x 63" table, 12" draw, 7000 lbs.
1—OSBORN #342-1 Jolt Rock-Over Pattern Draw, 23" x 38" table, 10" draw, 1000#.
3—OSBORN #559 Jolt Strip, 25" x 30".
2—OSBORN #405 Jolt Rollover, table 57" x 64", 26" draw, 3000 lbs jolt w/rollout.
3—OSBORN #721 Jolt Squeeze Pin Lift, 22" x 26" table, 6" draw, 800 lbs. jolt.
4—OSBORN #210 PJ Jolt Squeeze 16" x 20" table.
5—OSBORN #601 Jolt Rollover Pattern Draw, 600 lbs jolt cap., 30" flask size, 10" draw.
6—OSBORN #602 Jolt Rollover Pattern Draw, 22" x 36" table, 10" draw.
2—OSBORN #142 Jolt Rollover Hand Draw.
4—OSBORN #40 & #42 Hand Core Rollovers.
2—HERMAN Jolt Rollover Pattern Draw, 6000 series, 42" x 78" table, 6000 lbs.
2—HERMAN 40" x 60" Plain Jolt.
1—JOHNSON & JENNINGS #815 Jolt Rollover Pattern Draw, 30" x 40" table.
2—TABOR 22" x 42" Shockless Jar Rollovers.
2—TABOR 30" x 40" Shockless Jar Rollovers.
2—SPO #506 Jolt Rock-Over—24" x 25".
2—SPO #507 Jolt Rock-Over Pattern Draw, 32" x 40" table, draw 10 to 20".
1—SPO #508 Jolt Rock-Over Pattern Draw, 28" x 30" table, 9" draw, 1200# jolt.

SAND MULLERS

1—BEARDSLEY & PIPER #60 Speed Muller, 10 cu. ft. with 50 HP motor.
1—BEARDSLEY & PIPER #50, Speed Muller w/skip hoist, dust hood, 50 HP.
1—BEARDSLEY & PIPER #30 Speed Muller.
1—BEARDSLEY & PIPER #70 Speed Muller, 15 cu. ft batch size, w/100 HP.
1—BEARDSLEY & PIPER #3½ Mulbaro,
1—BESSER 36" x 42" Blade Type Mixer, horizontal drum, 12 cu. ft., w/7½ HP.
2—1500# capacity Sand Larry, portable, w/Fairbanks Morse Dial.
3—SIMPSON #2 style UD—6' pan diam. 1500# batch, with skip loader.
5—SIMPSON #3 style C, separate drive enclosed gearing 8' pan diam, 3000# batch, w/motor & reducers.
1—SIMPSON #1½, style UD, 4'6" pan 700# batch, w/skip hoist, water meter.

SAND BLASTING EQUIPMENT

1—HYDRO-BLAST Type M, Wet Abrasive, 7'5" v 4'5" x 8', door opening, 40" x 28", w/tank, 40 HP motor etc.
1—PANGBORN #7GK-2 Rotoblast Barrel, 30" x 38" drum, 7 cu. ft. cap. airless type, w/skip hoist.
1—AMERICAN WHEELABRATOR 27" x 36" Tumblast steel belt, with shot return, skip hoist & all electrical.

SAND PREPARATORS

3—B & P Model M Screenerators.
1—B & P #70 Portable Preparator w/gyrating screen, aerator, magnetic separator, 90 cu. ft. hopper.
1—AMERICAN Model AM Cutter, size 69/45.
1—AMERICAN Model BD Cutter, size 75/60.
1—ROYER Model NDP, portable on steel wheels, 20 to 25 tons per hour cap.
1—ROYER "Jr" portable on steel wheels, 4 to 7 tons per hour cap.
1—ROYER Model NC-2, Portable on steel wheels, 12 to 15 tons per hour.

SAND SLINGERS

1—B & P 19" Tractor Type, 13' arm.
1—B & P 16" Tractor Type, 13' arm, magnetic tower, 4' ramming 4" tip.

SHAKEOUTS & SCREENS

1—ROYER Combination Shakeout & Sand Conditioning unit, serial #ST-47.
4—SIMPLICITY 4' x 6' Model B, 5000#.
1—SIMPLICITY 4' x 10' Model D with Automatic Crusher, 15,000# load.
1—STONEY Core Knock-Out 8" x 20".
3—SIMPLICITY 3' x 6'—Model BG, 5000# safe load rating.
1—SIMPLICITY 6' x 8' Model DE, 16000#'s safe load, 2-20 HP motors.

SAND RIDDLES

10 — UNIVERSAL "Roto - Plane" Speed sifter, 20" diam, with 1/3 HP motor.

TUMBLING BARRELS

2—SLY 42" x 72" Square, with 10 HP Gearhead motor—magnetic brake.
1—SLY 42" x 66" Type C—10 HP motor.
1—SLY 24" x 36" with motor & drive.

AAA MACHINERY & EQUIPMENT CO.

15539 SARANAC ROAD — CLEVELAND 10, OHIO — CALL LI. 1-6545

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AIR BLOC HOISTS

Ingersoll-Rand Model RC-5

Many in New Condition . . .

194 Available

Purchased New in 1952 and 1953; Many in New Condition, Never Used. Those having been in operation a few months can hardly be distinguished from new.

500 lbs. Capacity

Roller Chain Lift

Maximum lift 10′ (Can be increased by lengthening of chain); Raised at 20 ft. per minute at 80# pressure, complete with top hook and ready for immediate operation.

This exceptional opportunity is the result of our unusually fortunate purchase, just made. Now is the time to solve your material handling problems at a fraction of new costs.

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1 to 3 . . . $199.50 ea.
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10 or more . $139.50 ea.

IMPORTANT NOTE:

Also included under these prices but not shown are the following extras (not illustrated).

1. **Pendant Throttle Control**
2. **Trolleys with each hoist**
3. **Chain Buckets**

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SAVINGS UP TO $335.50

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15539 SARANAC RD., CLEVELAND 10, OHIO Liberty 1-6545

For Sale

FOR SALE

CORE BLOWERS

Osborns, Model 91, 193, and 94
Redford—Bench type

GRINDERS

U. S. 7½ HP 3 speed 28" wheel
Marschke 10 HP, Swing Frame

MOLDING MACHINES—JOLT, SQUEEZE, STRIP

Osborn, 724 & 726 PJ, 4000 lb.
Milwaukee, 143, 163, and 183, 1500 lb.
Nicholls, Type D, 1500 lb.

MOLDING MACHINES—JOLT, SQUEEZE

Osborn, #275
Spo, Model 110 J
Nicholls, Type B

MOLDING MACHINES—JOLT, ROLLOVER

International—Type G Size 30 x 12
International—Type F Size 31 x 12
International—Type RES
Spo—Model 506
Herman—10,000 lb.—144" table
Tabor—30" Shockless type
Osborn—#601, 602, and 605
Osborn—#2047-4, Power

SANDMIXERS

Beardsley & Piper—#50
Simpson—#2

MISCELLANEOUS

Climax Wire Straightener—#2
Beardsley & Piper Screenerators—Model S 2000 lb. Fisher & Strohman Tilting Melting Furnaces
Dielectric Core Ovens

FOR THE BEST DEAL CALL

BALCHER MACHINERY COMPANY
6020 EUCLID AVENUE
CLEVELAND 3, OHIO
TELEPHONE: EXPRESS 1-8930

For Sale

FOR SALE

American Wheelabrator Tumblast 48" x 48" complete with loader and Dust Collector..$6000.00
American Wheelabrator Tumblast 36" x 42" complete with Dust Collector $3250.00
25—Osborn 2047-4 Jolt Rollover Molding Machines, 18" x 24" Table, 8½" Draw..$300.00
20—Tabor 10" Squeezers $100.00
Berkshire 10" Jolt Squeezer. Unused ..$225.00
Osborn 712Pv Stripper. Table 18" x 28". 6" Draw 12" cylinder $600.00
Osborn 710PV Stripper. Table 16" x 26". 6" Draw. 10" cylinder $450.00
Milwaukee Jolt Stripper. Table 32" x 38". 10" Draw. 16" cylinder $1000.00
Tabor #22 Hydraulic Jolt Rollover. Table 22" x 42". 10" Draw. Air Clamps $500.00
Demmler #2 Core Blower. Will blow core to 25 lbs $400.00
Gehnrich 5' x 4' x 5' Core Oven $250.00
Gehnrich 10' x 9' x 10' Core Oven $600.00
Simplicity Shakeout 6' x 8' $500.00
Hewitt-Robins Flotex 4' x 6' Shakeout..$750.00
B&P #40 Speed Muller. Air operated Discharge door $1000.00
B&P #S Screenerator $250.00
B&P #L Screenerator $500.00
2—American Wheelabrator Loaders for 27" x 36" Tumblast $300.00
3—Royer Sand Blenders. Sm., Jr., Med..$150.00
4—Ross & Federal Core Draw Vibrating Machines $75.00
Spencer Turbo Blower, 16 oz. 800 C.F.M. 5 H.P. Motor $300.00
Gogan Brinnell Electric Hardness Tester 4500 KG $450.00
Rotoclone Dust Collector, sludge Type, 2500 C.F.M., 5 H.P. Motor and Blower ..$750.00
American Dustube #185,16550 C.F.M., 25 H.P. Motor and Blower $1750.00
American Dustube #35, 3 H.P. Motor & Blower $300.00
Leeds & Northrup Homo Furnace—1200DF.—34" dia. x 72" High—complete with controls and heater $500.00
Complete stock of Sandblasting Cabinets, tanks, rooms, abrasive separator and Dust Collectors.

M. ELSTEIN
422-426 GRAND STREET
JERSEY CITY 2, NEW JERSEY

For Sale

CLOSE-OUT SALE AT BARGAIN PRICES

1—Whiting Corp. #30 Coal Pulverizing System, ready to go. Melts Air Furnace heats up to 50 ton @.....$3000.00 complete

1—Osborn #403 Pit Type Jolt Rollover Pattern Draw Molding Machine 20" x 44" Table @ $400.00

1—Royer Sand Blender, Model NDP @ .. $300.00

1—Bridgeport Floor Type Double End Ball Bearing Grinder 2" x 3" x 72" Spindle, Four 18" Wheels @ $100.00

1—Pangborn Type GJI Rotoblast 52" dia. x 40" Barrel, Side Dump, Top Loading, Rubber Barrel Liner and Loader, complete with Motors @ $1400.00

1—Chapman Swing Frame Ball Bearing Grinder 24" x 2½" Wheel @ $400.00

1—Marschke Type KXA 18" x 3" Floor Type, 3 Speed Double End Grinder, 15 H.P. Motor in Base @ $800.00

4—28" Dia. Man Cooling Fans @ ..$40.00 each

1—Lewis ⅛" Wire Straightener and Cut-Off Machine @ $80.00

1—Osborn #40 Rollover Core Machine @ $60.00

1—Bell Prime Mover with Dump Bucket 1000# capacity @ $300.00

2—Hoskins Electric Ovens Type FR-252, 2000° F Maximum Temperature, 14" x 24" x 35" Hearth @ ..... $450.00 each

Hines Pop-off Aluminum Flasks, Mold Weights, Cast Iron and Steel Core Plates Still Available. Write for Sizes and Prices.

EQUIPMENT PREVIOUSLY SOLD SHIPPED FROM NEW ENGLAND TO TEXAS AND CALIFORNIA WITH COMPLETE SATISFACTION.

KENCROFT MALLEABLE CO., INC.
BUFFALO 7, N. Y.
RIVERSIDE 1520

America's Largest Stock of Electric Melting Furnaces!

1—1500 KVA G. E. Transformer with taps for 11,000 or 13,800 volts.

Lectromelt 1 ton Side Charge with 800 KVA, 12,000 V transformer. Late type unit. Complete. Now in our Chicago warehouse.

1—Whiting Hydro Arc 8 MT Top Charge, 5600# per hour rate of melt, 8900# capacity of well, 8" electrodes. Furnace new 1952. 2000 KVA transformer, 12,000 volts. Complete with American Air Filter, smoke hood and Whiting Bag Type Dust and Smoke Suppressor. May be seen in place Chicago.

1—Chicago 3000# Electric Furnace, tilt back head. 4" electrodes, 800 KVA, 12,000 V transformer. Complete. May be seen in place Chicago.

1—Swindell Type 6 ton 9' diameter Shell Electric Furnace, 2500 KVA transformer, 13,800 or 11,000 V. In our Chicago warehouse.

Lectromelt 500# Side Charge Type T, 300-375 KVA transformer, 2300 V primary, Moore controls, G. E. circuit breaker. Late type. Now in our Chicago warehouse.

Transformers—2—2500 KVA furnace transformers, 11,000 or 13,800 primary voltage.

1—Detroit Electric, 1500# capacity, 13,200 primary voltage. Kuhlman transformers. Complete with controls.

Detroit Electric 350#, Type LFA with Kuhlman transformers and oil circuit breaker, 13,200 primary voltage.

Detroit Electric with 350# and 1000# tapered shells, 2300 V Kuhlman Transformer. Complete with panelboard and bus bars.

Herrault 2000# Side Charge, complete with Pennsylvania 1500 KVA transformer, 12,000 volt primary and 150-90 volt secondary. New control panel; new Field Rheostat, new motor generator set-ball bearing, 25 HP 3/60/440 V/1800 rpm, 250 V compound wound. With 51 nipples and sufficient roof brick for almost six roofs.

ACME EQUIPMENT CO., INC.

126 South Clinton Street, Chicago 6, Illinois
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UNCONDITIONALLY GUARANTEED EQUIPMENT REBUILT BY UNIVERSAL

AIR COMPRESSORS

1—40 HP SULLIVAN, Model B-Bim #8, WL 60 w/Receiver.

BLOWERS

1—85 HP G.E. Cupola Blower, 24 oz.
3—7½ HP FISHER, 16 oz.
15—CENTRIFUGAL BLOWERS, 350 CFM to 10,500 CFM.

CLEANING EQUIPMENT

1—AMERICAN #1 MULTITABLE, 6 aux. tables 15", main table 45".
1—ROBBINS SHAKEOUT, 4' x 2'.
1—AMERICAN WHEELABRATOR 72" SWING TABLE with Elevator; installed 1953; used 2 months.
1—PANGBORN #3½ GK ROTOBLAST.
1—AMERICAN #2 MULTITABLE, 5 tables, 37" dia.
2—SIMPLICITY SHAKEOUTS, 4' x 6'.
1—LINK BELT SHAKEOUT, 5' x 8', 5 HP Motor.
5—US GRINDERS, double end, 10, 15, 20 HP.
4—GRINDERS, Swing frame, 15 HP.
2—TUMBLING BARRELS, Cast Iron, 36" x 24" w/2 HP Motor.
2—TUMBLING BARRELS, Square, 34" x 48".
2—TUMBLING BARRELS, Side Tilt, 18" wide x 20" deep.
3—TABOR CUT-OFF Saws, 5 & 10 HP.

CONVEYORS

4—SAND ELEVATORS, various sizes.
1—STEEL PLATE MOLD, 90' centers, 30" belt, w/drive.
2—STEEL PLATE MOLD, 90' centers, 24" belt, w/drive.
6—SAND BELT CONVEYORS, 10' centers to 140' centers, 18" to 36" belt, complete w/drives and hoppers.
2—CASTING CONVEYORS, wire mesh, 18" x 32" w/drive.
FOUNDRY TYPE ROLLER CONVEYOR—ALL SIZES—SEND REQUIREMENTS

CUPOLAS

1—WHITING, #4, with skip charger motor and blower.
1—WHITING # 6, Complete.
1—WHITING #7.
1—MORRIS #9, w/skip, mixing ladle, never used.
1—WHITING #3½, w/Blower & Air weight Control.
1—WHITING #5, w/Blower & Air weight Control.
1—MODERN, #3, 46' shell, w/blower.
1—SKIP CHARGER, 3 bottom drop buckets, blower, motor, and scale for #9 Cupola.

CORE BLOWERS

1—CB-400 CHAMPION. 1—3K DEMMLER.
1—#55 DEMMLER. 1—#92 OSBORN.
1—FEDERAL, San-Blo.
1—SB 13 INTL.

FLASKS & CORE PLATES

400 TONS, CAST STEEL, STRUCTURAL STEEL and STERLING TYPE FLOOR FLASKS—ALL SIZES.

20 TONS, FLAT STEEL and PERFORATED STEEL CORE PLATES. SEND FOR COMPLETE LISTINGS.

FURNACES—DIRECT ARC MELTING

1—150#/hr. "LECTROMELT".
1—250#/hr. Hydraulic Top Charge.
1—500#/hr. MOORE.
1—1 Ton WHITING Top charge.
1—2 Ton SWINDELL, Top charge.
1—1000# SWINDELL.
1—2 Ton WHITING top charge.
2—3000# HEROULTS.
1—2 Ton HEROULT.
1—6 Ton HEROULT.
Several 3 Ton to 10 Ton capacity Side and Top Charge Furnaces.

FURNACES—DETROIT "ROCKING"

2—200# cap. DETROIT, complete.
3—350# cap. DETROIT, complete.
1—1000# cap. DETROIT, complete.
1—3000# cap. DETROIT, less transformer.
1—1500# DETROIT, Complete.
1—60# DETROIT, Complete.

FURNACES—INDUCTION MELTING

1—20 KW AJAX Spark Gap High Frequency, 17 lb. capacity in steel.
1—25 KW AJAX HIGH FREQUENCY M. G. SET with CONTROLS, 50# CAP.
2—60 KW, AJAX-TAMA-WYATT, Alum.
1—80 KW, GE, 9600 Cy., MG Set.
3—333 KW, AJAX-TAMA-WYATT, 1500# Alum.
1—175 KW, 960 CY., MG Set, 1000# Cruc.
1—166 KW, AJAX, 60 Cy., Alum.

FURNACES—OIL AND GAS

1—HAUSFELD Tilting #675, 250 cruc. Oil.
1—FISHER 4 Burner MNP, 1700#, gas.
3—WALKER YORK #400 cruc. tilting, coke fired.
1—SKLENAR 600#, Oil fired.
7—HAUSFELD 1000#, tilting, oil fired.
1—HAUSFELD Tilting, 1200# Mag.
3—MONARCH Oil Fired Stat., #60 cruc.
1—R & S Convection Draw, Car bottom, 18' l x 8' w x 5' h, oil fired, dismantled, controls.

LADLES & POURING DEVICES

2—6 TON TEAPOT, Worm Geared.
2—WHITING 3 Ton, Bottom pour.
3—MODERN #F-9 POURING DEVICES.
4—10 TON BOTTOM POUR, 55" x 55".
2—15 TON BOTTOM POUR, 65" x 59".
2—45 TON TREADWELL, Excellent.
1—20 Ton lip Pour, 72" x 72".
1—SWINDELL, Elec. Holding.

MOLDING MACHINES

1—SHELL-O-MATIC Shell Molding Machine.
2—HERMAN ROLLOVERS, 26 x 30", 750#.
1—HERMAN ROLLOVER, 1500#.
1—SPO Port, Jolt Rollover, #506-1.
8—OSBORN #275J Jolt Squeezers.
2—SPO #110J Jolt Squeezers.
5—MILWAUKEE Jolt Pin Lift 32" x 38".
2—MILWAUKEE Jolt Squeeze Strippers, #163.
1—J & J #612 Port. Rollover, 24" x 30".
1—J & J #815-B Rollover.
3—INTERNATIONAL "G", 24" x 10" Jolt Rollovers.
5—OSBORN Jolt Rollovers, Hand Draw, #142.
3—TABOR Jolt Squeeze in Head.
1—OSBORN #243 Jolt Rollover.
1—OSBORN #559 Jolt Stripper, 25" x 30".
1—DAVENPORT 28SA, 28" x 40".
3—HERMAN Rollover & Jar, 6000#, 60" x 80".
2—HERMAN JOLT ROLLOVERS, 3000#.
11—DAVENPORT #30-T Jolt Strippers.
2—TABOR POWER ROLLOVERS, #2242 w/clamps, late.
1—TABOR Jolt Stripper, 20" x 20", 4" draw.
2—TABOR ROLLOVERS, 30" x 40".
1—SPO, 9336, Jolt Clamp rollover draw.

MULLERS AND MIXERS

2—SIMPSON #3, enclosed gears.
2—SIMPSON #2, Unit Drive.
2—CLEARFIELD #610 and #920.
1—BEARDSLEY & PIPER #60 SPEEDMULLER, 60 HP motor, SKIP-LOADER.

OVENS

1—TOWER CORE OVEN, 14" x 60" trays, 45' high, Gas fired, dismantled.
2—ROSS 2 comp., rack, gas, 6½ x 14 x 7.
1—CRAWFORD, Gas Fired, 3 drawers.
1—HOTPOINT EDISON, ELECTRIC, 6 drawers, 30" x 40" x 8".
1—YOUNG BROS. 3 compartment, kiln type tlectrically heated, with CONTROLS.
1—YOUNG BROS. 2 compartment, drawer type, oil or gas, 82" h x 12' w x 6' l.

SAND CUTTERS

5—AMERICAN SAND CUTTERS—
1—MODEL "AA", 60" reel, Gas Driven.
1—MODEL "K", 72" reel, Gas Driven.
1—MODEL "F", 80" reel, Gas Driven.
1—MODEL "D", 76" x 96".
1—SANDMASTER, 70/102, New in 1950, Rubber Tires.

SAND LABORATORY EQUIPMENT

1—TEST CORE BAKING OVEN #606.

SAND PREPARATORS

1—REDDY SAND UNIT, HANDY SANDY.
2—JEFFREY SANDITIONERS, Portable.
1—SCREENERATOR "M".
2—ROYER SAND BLENDERS, 16" belt, 12" belt.
1—LINK BELT REVIVIFIER, Size 5.
2—B & P SAND CONDITIONERS, portable.
1—HETHERINGTON & BERNER SAND DRYER, rotary, oil fired, #552.

SAND SLINGERS

1—BEARDSLEY & PIPER MOTIVE JR. 19" head.
1—BEARDSLEY & PIPER TRACTOR TYPE 16" head, magnetic separator.
1—PORTABLE SLINGER, 16" head, 4' long, on Truck.

TESTING MACHINES

1—TINIUS OLSEN, UNIVERSAL, 100,000# capacity.
1—TINIUS OLSEN, BRINELL HARDNESS, 3,000 KG.
1—RIEHLE, UNIVERSAL, 2 screw mechanical, 100,000# capacity.
1—RIEHLE, BRINELL HARDNESS, hydraulic, 3,000 KG.
1—ROCKWELL HARDNESS, #5JR with "C" Brail.
1—BALDWIN - TATE - EMERY, UNIVERSAL, Hydraulic tensile, 24,000#.

TRUCKS

1—CLARK, FORK LIFT, 108" lift, Gas.
2—HOUGH PAYLOADERS, Model HA, Hydraulic Trip.
Outside Yard Crane Runway, 2-5 Ton Cranes, 50' span, 400' long.

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THE ACME BARGAIN PAGE

AIR COMPRESSORS

Chicago Pneumatic 50 HP direct motor driven Type P-4.

BLOWERS

Ingersoll-Rand Motor Blower Type FS. Single Stage 4000 CFM @ 3.75 PSI, 100 HP, 220V G. E. Induction motor.
General Electric 7500 CFM, 20 oz., 89.6 Max. HP, 220V motor, Airway controls.
Ingersoll-Rand turbo compressor 10500 CFM @ 20 oz. 85 HP G. E. 220V 3500 CFM motor.

CLEANING EQUIPMENT

Sly 8′ dia. Table Shot Blast Unit.
Wheelabrator 27″ x 36″ rubber belt.
36 x 42 Halloway 7½ HP shot motor elevator and dust collector.

CORE BLOWERS

3—International SB 12.
4—International SB 13.
1—International SB 15.
2—Osborn 93.
2—Osborn 193.
1—Osborn 2035-2.
1—Peterson (Similar to Demmler #50).
1—Osborn 5 Station Rotocore Automatic Core Blower. New 1952.

CORE OVENS VERTICAL HORIZONTAL

2—Coleman, combination oil or gas fired 43 carriers 24″ x 90″—1 hour 12 min. to 4 hours 48 min. cycle.
1—Coleman, combination oil or gas fired 43—2 shelf carriers 30″ x 144″ long. 2 hour 12 min. to 7 hour 24 min cycle. Present replacement cost over $90,000.

GRINDERS, SNAGGING

5—Hammond 10 W R I Double End Snag. Grinders 20″ dia. wheels, 10 HP 220/440 V motors, variable speed drives.
3″ x 24″ U.S. #65, 20 HP 220/440V.

GRINDERS, SWING FRAME

2—3″ x 24″ x 12″ Fox #4, 15 HP.
1—3″ x 24″ x 12″ Marschke, 20 HP.
1—3″ x 24″ x 12″ U.S. 15 HP.

MOLDING MACHINES

Jolt Squeezers:
13—Milwaukee 103-11 Staty. Jolt Squeezers, 13½″ x 20″ table.
7—Champion JS10P Portable Jolt Squeeze molding machine, 18″ x 21″ table.

Jolt Squeeze Pin Lifts BIG ONES:
1—Osborn 724 PJ 38″ x 56″ table, 24″ squeeze cylinder 11″ jolt cylinder 10″ draw.
3—International PK 20's. 20″ squeeze cylinder 8″ draw. Ser. #67237. New 1949.
1—Osborn 712 PJ. Stationary Jolt Squeeze pin lift 18″ x 28″ table, 12″ squeeze cylinder, 6″ draw.
2—Milwaukee Jolt Squeeze Strippers, Model 163-50, 15″ x 24″ table 16″ X open end pattern size.
1—SPO 214 Jolt Squeeze Pin Lift.

ROLLOVERS—

Jolt Rollover Pattern Draw
1—Herman 4000# Series 30″ x 60″ table, 32″ x 48″ bumper.
1—Herman 3000# Series 40″ x 84″ table, special slotted table.
1—Herman 1500# Series 20″ x 36″ table.
2—Herman 750# Series 20″ x 30″ table.
2—Herman 750# Series 20″ x 24″ table.
All the above have air clamps rollout tables.
2—Champion JM-18-8 Jolt Rollovers, portable 13½″ x 20″ tables.

Jolt Pin Lifts:
Johnston & Jennings 1015, 20″ x 38″ table.
Pin Lift Pushoffs:
2—Chapion Pin Pushoffs 28″ x 42″ table 10″ draw.

CASTINGS CONVEYORS OR COOLING TOWER

4580—Jervis B. Webb 678 chain 6″ rail 1560 trolleys 4-DC speed reducer and motor generator set 3 speed recorders 400 casting boxes and V shaped baskets large quantity turns, takeups, etc. This has been used as a single unit, but will divide, 75 tons structural steel outdoor tower, 125′ long 20′ wide 45′ high, open steel frame with roof.

MULLERS AND MIXERS

B&P #70 with dust hood and bucket, 100 HP 220/440V motor, starting compensator.
Simpson #3 Motor on Base.
Simpson #3 Type H open gear type.
Simpson #3 Muller with bucket loader.
Simpson #3 Open Gear type, $1000.
Clearfield #404 Muller.

OVENS, MOLD OR CORE

Porbeck Double Car Single door 16′ long 14′ wide 9′ high gas fired 600° recirculating complete with 7½ HP car puller, in place St. Louis, Mo.
Core Oven Electric 68″ x 42″ high, 65″ deep 100°-650°.

POURING DEVICES

13—Pouring devices, Whiting 750# and 1500#.

PREPARATOR

B&P #70 Preparator. Only used 3 months.

SHAKEOUTS

Link Belt 3 x 5.
Simplicity 4 x 6 Heavy Duty 15 HP motor.

SAND SLINGER

B&P Stationary Slinger with bucket elevator to 10′ x 10′ x 6′ sand storage bin, conveyor feeder to double belt head 19″ head single speed.

TUMBLING BARREL

1—Whiting double tumbling barrel 36″ x 60″ Jones reducer 15 HP.

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bucket sand handling
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SAND MULLERS:

Simpson—2—#3 Unit Drive
1—#3 Model H
B - P —1—#70 without loader
1—#30 with loader
1—7 cu. ft Mulbaro

CUPOLAS:

2—#11 Whiting with skip bucket loaders
1—#7 Whiting without loader
1—#3½ Modern without loader

CORE OVENS:

Coleman 2-compartment, recirculating, gas fired, with all controls, 6′ x 7′ doors, overall 14′7″ x 17′4″.

AIR COMPRESSORS:

150 HP 800 CFM Ingersoll-Rand two stage horizontal, with air receiving tank, 220/3/60.

LARGE MOLDING MACHINES:

Osborn 405-95 Rollover 26″ draw.
Davenport 40A & 40SA Rollovers
Herman 40″ x 60″ Rollover
Nichols—Jolt Squeeze Stripper 24-54D
Strippers—Nichols, Osborn, SPO

MOLD CONVEYORS:

109 cars 32″ x 39″ plain top, heavy duty, extra drive. 220/440/3/60. Mfr.—Webb Company

1—Link-Belt Roller-type car power mold conveyor, 27′ x 70′6″ centers, 35 cars 38″ x 72″, complete with drive, speed reducer, motor and controls, 220/440/3/60.

BLAST CABINET:

1—large American Wheelabrator cleaning cabinet with monorail, 6 cleaning units, 220/440/3/60.

CRANES:

1—3 ton Bedford Overhead Bridge Crane, 40′ span, 120′ runway, 220/440/3/60.

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Core Blowers
Exhausters
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- Annealing
- Heat treat

Grinders:
- Horizontal disc
- vertical disc
- double end stand
- swing

Ladles:
- Industrial
- Modern
- Timken
- Whiting

Molding Machines:
- Jolt Squeezers
- Jolt Strippers
- Jolt Rollovers
- Jolt Squeeze Strip
- Pushoff

Scales
Sawtables
Sand Slingers
Shake-outs
Sand Mullers
Sand Conditioners
Magnesium Cleaning cabinets
Tumbling mills

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- Hines Popoff
- Steel

Truck—Ford Dump

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The Keen Foundry Company, Griffith, Indiana began operations in 1927 with an output capacity of 100 tons per month. Today this same company utilizes ten acres of ground and has a capacity of more than 750 tons of castings per month—conclusive proof of product quality and customer satisfaction.

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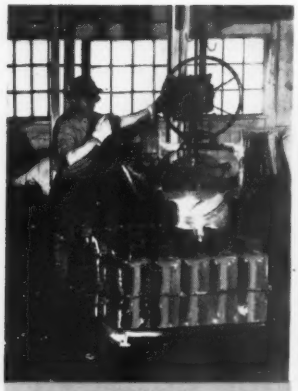

Dry Sand molding department mechanical pouring in assembled cylinder molds made up of core sand—7 cores in each mold.

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Sand and water are only part of the picture

...SMITH L-O should be included, too!

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Take advantage of this combination of factors and increase productivity and profits. Get Smith L-O Core Oil for your core room. It is available in 20 grades to suit your needs. It is Dow-Therm processed to assure controlled-uniformity shipment after shipment.

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- FOUNDRY SERVICE CO. Birmingham, Alabama
- F. F. SHORTSLEEVE Elmira, New York
- PACIFIC GRAPHITE CO., INC. Los Angeles 22, California
- ST. LOUIS COKE & FOUNDRY SUPPLY CO. St. Louis, Missouri
- WESTERN FOUNDRY SAND CO. Seattle, Washington
- WESTERN INDUSTRIAL SUPPLY CO. Portland 14, Oregon
- MALCOLM G. STEVENS Arlington, Massachusetts

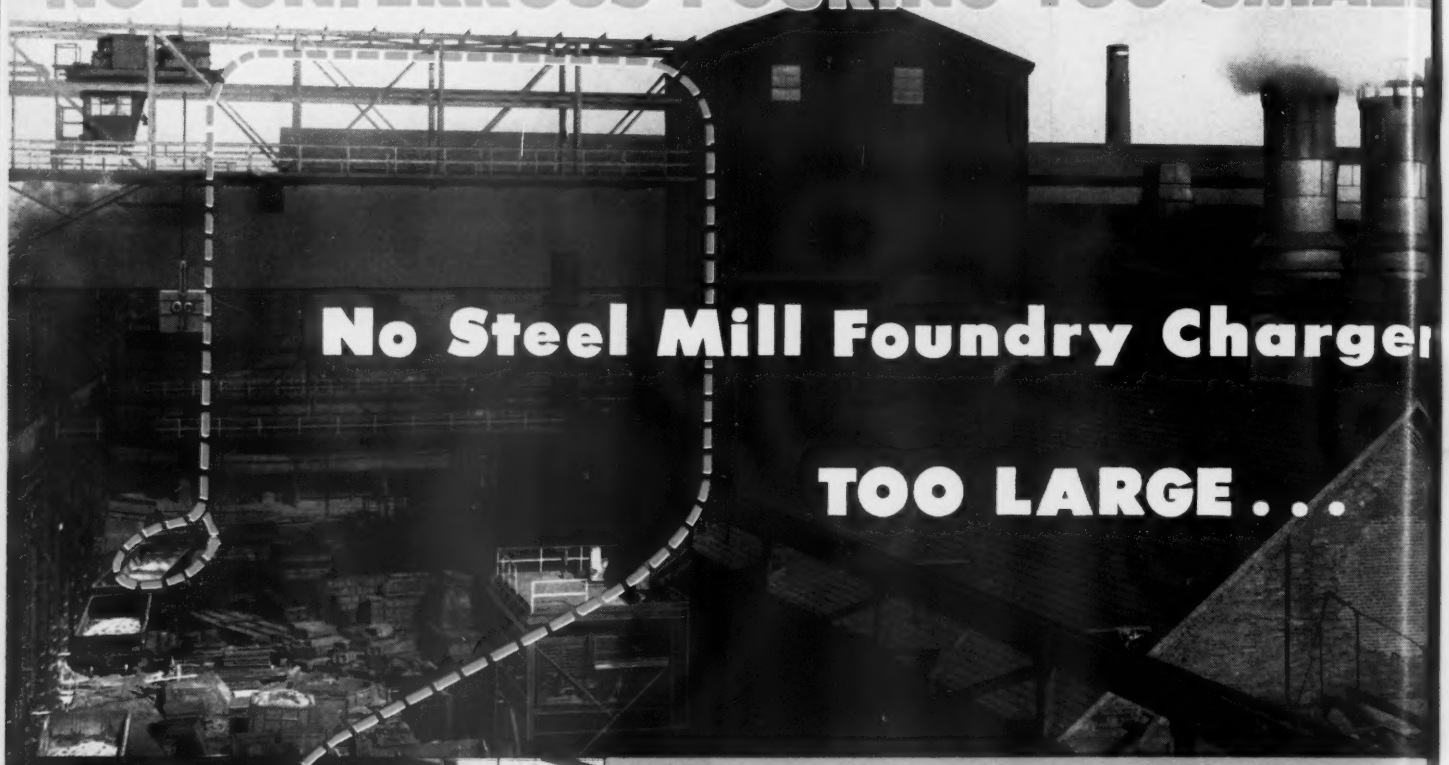
Smith L-O Core Oil

ROD DIP LIQUID PARTING

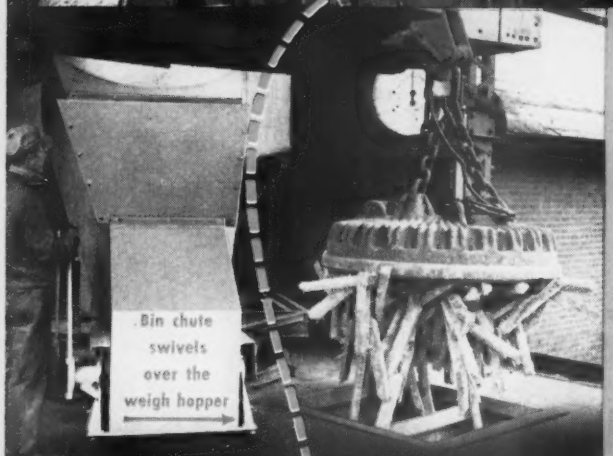
SMITH OIL & REFINING CO.

INDUSTRIAL OILS DIVISION • ROCKFORD, ILLINOIS

NO NONFERROUS POURING TOO SMALL



No Steel Mill Foundry Charger TOO LARGE . . .



Coke and stone, unloaded by a MODERN crane and gravity fed to a MODERN weigh hopper simplifies charging through the MODERN SMALL-CONE cupola bucket.

WORKING TOGETHER with practical foundrymen MODERN engineers pioneered mechanical pouring in the small foundry. Then all down through the years for more than thirty years one outstanding achievement blazed the way for another and a tougher job. . . .

Typical of the range and flexibility of today's mechanical charging is this 100% MODERN system shown in operation here. Coke and stone, from gondola cars, flows to cupolas without interruption. Every operation from MODERN yard-crane to SMALL-CONE SIDE-DISCHARGING bucket has been synchronized to reduce handling cost and further boost the temperature of metal poured.

More complete details will be mailed on request. Just return the coupon for catalogs or free loan of MODERN sound, color, motion, picture films. . . . .

MODERN EQUIPMENT CO.
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Without cost or obligation mail:

Catalog on metal pouring systems	P-152 ☐
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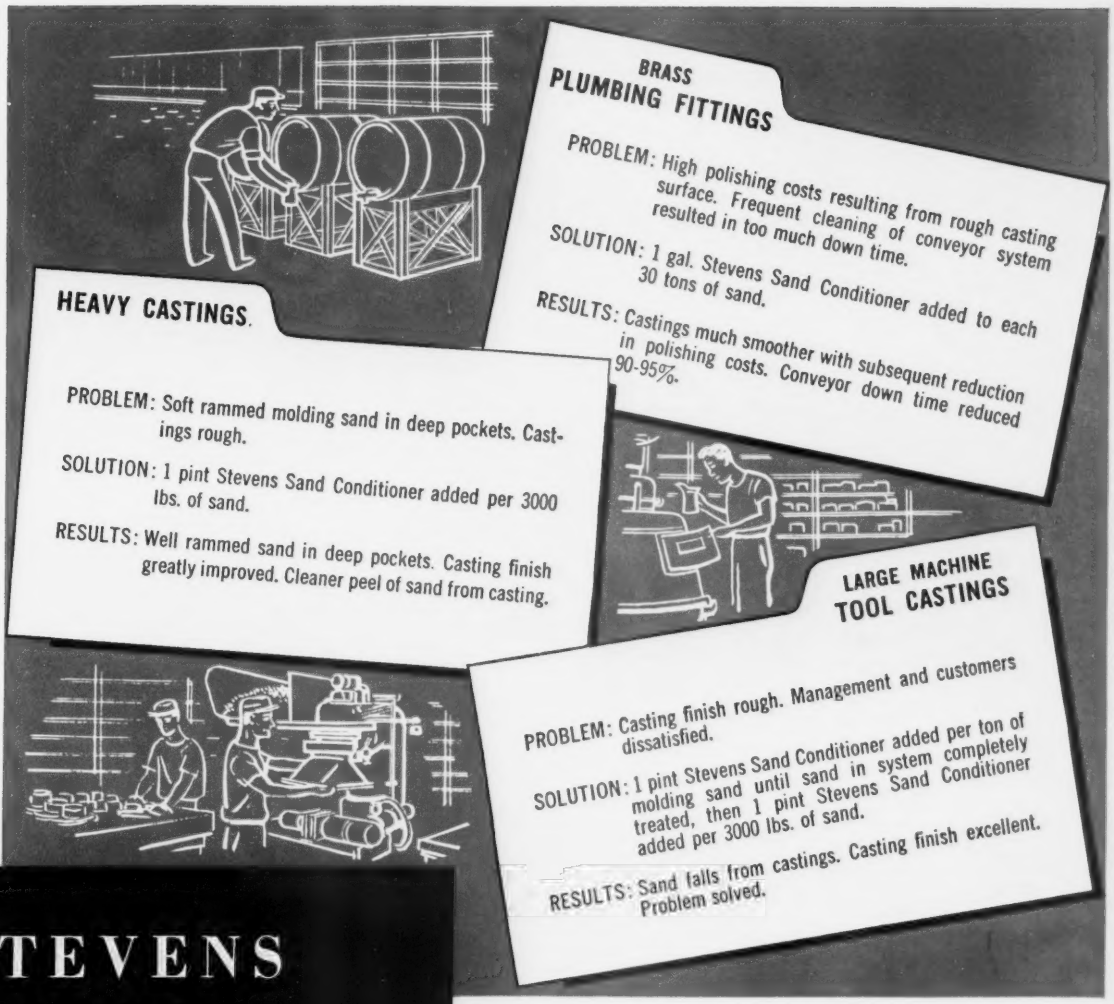
BRASS
PLUMBING FITTINGS
PROBLEM: High polishing costs resulting from rough casting surface. Frequent cleaning of conveyor system resulted in too much down time.
SOLUTION: 1 gal. Stevens Sand Conditioner added to each 30 tons of sand.
RESULTS: Castings much smoother with subsequent reduction in polishing costs. Conveyor down time reduced 90-95%.
HEAVY CASTINGS
PROBLEM: Soft rammed molding sand in deep pockets. Castings rough.
SOLUTION: 1 pint Stevens Sand Conditioner added per 3000 lbs. of sand.
RESULTS: Well rammed sand in deep pockets. Casting finish greatly improved. Cleaner peel of sand from casting.
LARGE MACHINE
TOOL CASTINGS
PROBLEM: Casting finish rough. Management and customers dissatisfied.
SOLUTION: 1 pint Stevens Sand Conditioner added per ton of molding sand until sand in system completely treated, then 1 pint Stevens Sand Conditioner added per 3000 lbs. of sand.
RESULTS: Sand falls from castings. Casting finish excellent. Problem solved.

STEVENS SAND CONDITIONER

solves both mold and core production problems

These recent cases, taken from our files, show what Stevens Sand Conditioner has done to assure better castings for a few of the many satisfied Stevens customers. Here's how Stevens Sand Conditioner can help solve your core and mold production problems:

1. Increases flowability of core and molding sand to prevent soft rammed areas and pockets.
2. Cores draw easier from boxes, patterns draw easier from molding sand.
3. Improved casting finish on core and mold surfaces.
4. Sand peels better from castings.
5. Prevents sand from sticking in mullers, conveyors, hoppers and all sand handling equipment.

Get more facts about this non-toxic, low-cost Sand Conditioner today. Call your Stevens Sales Representative, or write direct for Stevens Technical Bulletin F 101. FREDERIC B. STEVENS, INC. Detroit 16, Mich.

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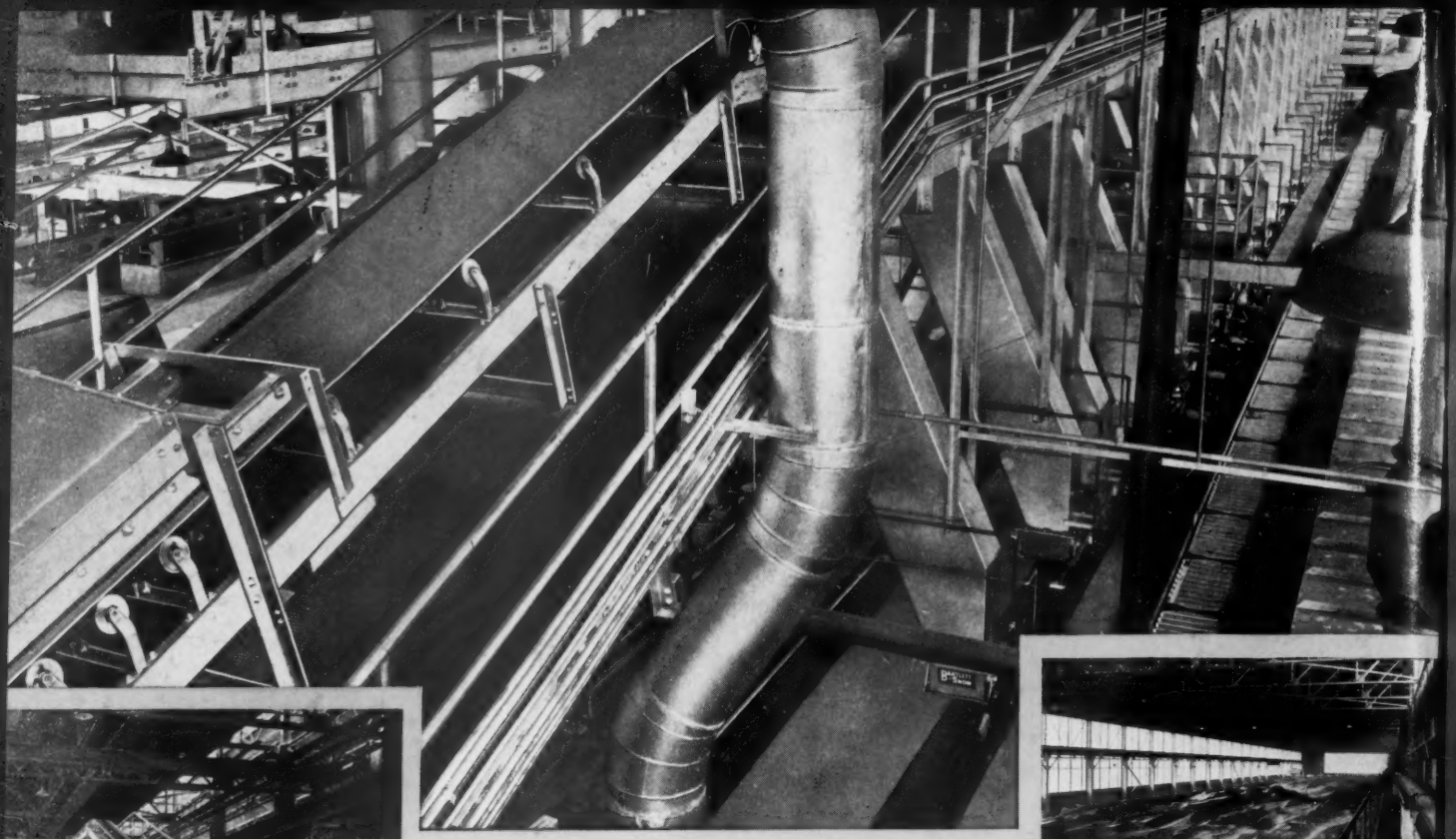
STEVENS TARGET SALES SPECIALS FOR AUGUST SEPTEMBER

STEVENS SAND CONDITIONER & LAUTHAN STRAINER CORE SHAPES

Write today or ask a STEVENS representative for details



Above; View of Prepared Sand Handling and Distributing System in Large Automotive Foundry.

Above; View in Large Implement Foundry Showing Distributing System, Molders Hoppers and Mold Conveyor; At Right: Distributing Dried and Cooled New Sand to Bulk Storage Bin.

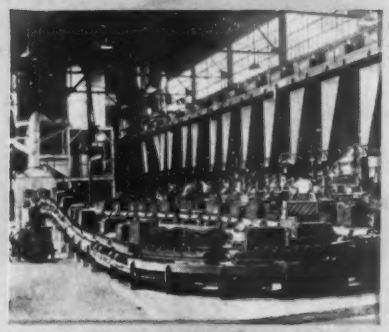
new
prepared
core
shakeout
and
waste

Sand Handling

SYSTEMS

including controlled screening, cooling, aeration and mulling;— assure unvarying uniformity day after day;— more molds per day with less effort;— better castings with less scrap;— and increased output per man and square foot of floor area.

Prepared Sand Distributing Belt Showing Adjustable Plows that Discharge Sand to Hoppers on Either Side of the Belt.



General View in Jobbing Foundry Showing Sand Distributing System, Molders Hoppers and Self Dumping Car Type Mold Conveyor.

● Complete systems engineered to meet your individual requirements. Coordinated sand handling, molding, core setting, pouring, cooling, shakeout and reclaim equipment. A *vital* necessity for *every* size and every type of foundry. Let us help reduce your costs by modernizing your foundry operations!

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